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THEOPHILUS MACK, M. D.,

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HOSPITALS, INFIRMARIES,

AND

DISPENSARIES:

Theophilus Mack
THEIR CONSTRUCTION, INTERIOR ARRANGEMENT,
AND MANAGEMENT,

WITH

DESCRIPTIONS OF EXISTING INSTITUTIONS,
AND REMARKS ON THE PRESENT SYSTEM OF AFFORDING MEDICAL
RELIEF TO THE SICK POOR

BY

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LONDON:

JOHN CHURCHILL AND SONS, NEW BURLINGTON STREET.

MDCCCLXVII.

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P R E F A C E.

It might appear superfluous for me to write on Hospitals, and the system of relief to the sick poor, considering the number of treatises and pamphlets relating to the subject. It is scarcely four years since Miss Nightingale presented the public with the third edition of her valuable work, which contributed not a little to diffuse sound principles relative to the construction of Hospitals in this country. Shortly afterwards Dr. Bristowe and Mr. Holmes wrote their able Report, for which the profession owes them its thanks. Nor have continental authors been behindhand. M. Husson's remarkable work stands out overshadowing all others by its splendid illustrations and variety of contents ; and a few less comprehensive essays, in which, however, some of the principal points are treated with great clearness, have reached me recently. I venture, nevertheless, to hope that this work will meet with the approval of an indulgent reader. In some degree, I differ from other writers. I am not acquainted with any English work treating the subject as a whole, and comprising Hospitals, Dispensaries, and other means by which relief is afforded to the sick poor. The construction and management of Dispensaries is only second in importance to that of Hospitals, and the relief which the poor obtain by being visited at their homes deserves equal attention. In a country where committees and boards of guardians manage most of these institutions, it may not be out of place to draw everything relating to the system within the sphere of public criticism.

In a former edition written in German, and published in 1859, but

now out of print, I described only a few Hospitals, but in the present work I have endeavoured to include all the most noteworthy establishments in existence. The second Part, containing these descriptions, may possibly serve as a practical guide to those who may be inclined to visit the institutions. It has been my object to give more detailed accounts of those establishments which have been opened during the last few years. Some that had not been previously described, I specially visited; others I have had occasion to visit at various periods: but in many instances I had to rely on reports and the accounts furnished by other authors, and I confess with pleasure that I have availed myself of descriptions and illustrations found in the valuable works mentioned above.

I should not have been able to lay before the reader these pages, imperfect as they are, if I had not had the assistance of others, who kindly supplied me with correct information and tracings of various buildings. I am greatly indebted to those gentlemen, who at some inconvenience to themselves, cheerfully responded to my various inquiries: and it is in compliance with the expressed wish of many who thus assisted me that I refrain from making their names public.

F. OPPERT.

Great Russell Street, March, 1867.

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LITERATURE.*

- *Tenon, Mémoires sur les Hôpitaux. Paris. 1780, 86, 88.
Howard, Lazarettos in Europe. London. 1789.
Rochefoucauld, Rapport du Comité de Mendicité. Paris. 1790.
Corvisart, Leroux, et Boyer : Rapport sur l'Hôp. des Enfants Malades. Paris. 1805.
Duchanoy, Projet d'une nouv. Organisation des Hôpitaux. Paris. 1808.
Rapport au Conseil Général par le Comte de Pastoret. Paris. 1808.
Clavareau, Mémoire sur les Hôpitaux Civils. Paris. 1810.
Darcet, Les Fumigations, &c. 1818.
*Delpech, Mémoire des Hôpitaux du Midi. 1829.
*Phelan, Charities of Ireland. 1833. Dublin.
Parent Duchatel, Annales d'Hygiène publique ; Sur les Vidanges, &c. Paris. 1835.
Richardson on Warming and Ventilation. 1837.
Pozzi, Polizia degli Spedali. Livorno. 1839.
Stark, Plan zur Einrichtung eines Krankenhauses. Erlangen. 1839.
*Cerfberr, on Italian Hospitals. 1841.
Gerando (de), le Visiteur du Pauvre. Paris. 1841.
*Poumet, Mémoire sur la Ventilation. Paris. 1844.
*Ambrosili Ambrogio, Rapporto della Commissione Incaricata della visita agli Istituti di Beneficenza in Venezia. 1847.
*Thorr, Bemerkungen über den Bau u. d. innere Einrichtung eines Krankenhauses. München. 1847.
Dr. Bosch, Rapport au Conseil de l'Administration des Hôpitaux à Bruxelles. 1851. Tircher.
*Dr. Stein, Das Krankenhaus Bethanien. Berlin. 1848.
*Hill Hassall, Microscop. Examination of the Water supplied to London. 1850.
Riegler, Das Neue oder das Zweikmässige im Baue, in der Einrichtung, und im Hausrathe der Spitäler. Wien. 1851.

* The works marked with an * have been specially consulted by the author.

- *Uytterhoven, Notice sur l'Hôpital St. Jean à Bruxelles. 1852. Brussels.
- Report on the Queen's Hospital, Birmingham. 1852.
- Roubaud, sur les Hôpitaux. 1853. Paris.
- *Péclet, sur la Chaleur. 1833. Paris.
- *Ashpital and Whichcord, Baths and Washhouses. London. 1843.
- *Berichte über das Krankenspital zu Wieden. 1853, 1866.
- *Roberton, J., on the Defects of Ventilation. Manchester. 1856 and 1860.
- History of the New York General Hospital. New York. 1856.
- *Conolly, Treatment of the Insane. London. 1856.
- Stubenrauch, Moritz v., Statist. Darstellung des Vereinswesens im Kaiserthum Oesterreich. Wien. 1857.
- Oppert, Reisebericht, allg. Medicinische Centralzeitung. 1857 and 1858.
- *Esse, Die Krankenhäuser. Berlin. 1857.
- *The *Builder*, 1858-66, especially February, July, November, 1864; June, July, and August, 1865.
- Förster's Bauzeitung, 1858; Beschreibung des Hospitals Lariboisière, Von Dr. Oppert.
- *Pettenkofer, L., über den Lustwechsel. München. 1858.
- Oppert, Dr. F., Die Einrichtung von Krankenhäusern. Berlin. 1859. Bei Springer.
- *Pappenheim, Sanitätspolizei. Berlin. 1859.
- *Grassi, Etude compar. sur les deux Syst. de Chauffage et Ventilation à l'Hôp. Lariboisière. Paris. 1856.
- „ Rapport sur la Construction et l'Assainissement des Latrines et Fosses d'Aisance. Paris. 1859.
- *Bembo, Count, Delle Istituzione di Beneficenza nella Città e Provincia di Venezia. 1860.
- *Jebb, Sir Joshua, Report on the Convict Prisons and the Establishment for Invalid Prisoners at Woking. 1860.
- *Verga, Dell' Ospedale Maggiore di Milano. Milan. 1860.
- *Luna, Count di, Annales d'Hygiène Publique. Paris. 1861.
- Paget, Address before the Medical Association. 1862.
- *Degen, Die Einrichtung der Krankenhäuser. 1862. Munich.
- *Hugenberger, Dr. T., Puerperal Fever in Petersburg. 1862.
- *Husson, A., Etude sur les Hôpitaux. Paris. 1862.
- *Berti, Intorno ad alcuni stabilimenti del' alta Italia. 1862.
- *Larrey, le Baron, Notice sur les Hôpitaux Militaires. Paris. 1862.
- Levi, M., Salubrité des Hôpitaux (Bulletin de l'Académie). Paris. 1862.

- Holmes, T., in "System of Surgery." 1862.
- Lefort, sur les Hôpitaux Anglais. Paris. 1862.
- *Blondel et Ser, Rapport sur les Hôpitaux Civils de la Ville de Londres. 1862. Paris.
- *Sixth Report of the Medical Officers of Privy Council, Dr. Bristowe and Mr. Holmes. Eyre and Spottiswoode, London. 1863.
- *Nightingale, Miss F., Notes on Hospitals. London. 1863.
- *Simon, J., Reports of Public Health. London. Eyre & Spottiswoode.
- *Report of the Royal Commission (Dr. Sutherland, Captain Douglas Galton), appointed for Improving the Condition of Hospitals and Barracks. 1863.
- *Schauenstein, Handbuch der öffentl. Gesundheitspflege in Oesterreich. Wien. 1863.
- *Parkes, E., A Manual of Practical Hygiène. London. 1864 and 1866.
- *Reports of the American Association in the American Journal of Mental Science. Utica, New York. 1864-66.
- *Martin, Sir R., on Hospitals, in T. Holmes' System of Surgery. 1854.
- Dr. Stæle, Guy's Hospital Reports, 1865, on the Ventilation of the New Block added to the Hospital.
- *The *Lancet* Commission on the Metropolitan Workhouse Infirmaries. 1865.
- Tardieu, Projet de construire l'Hôtel Dieu : Annal. d'Hygiène. 1865.
- Davenne, De l'Organisation et du Régime des Secours Publiques en France. Paris. 1865.
- Rouillet, Rapport sur les Hôpitaux de Genève, Turin, et Milan. Paris. 1864.
- *Evans, La Commission Sanitaire des Etats-Unis. Paris. 1865.
- *Dr. Laehr, Die Irrenanstalten Deutschlands. Berlin. 1865.
- Angiboust, Mémoire sur la Ventilation et le Chauffage. Bordeaux. 1865.
- *Lefort, Hygiène Hospitalière. Paris. 1865.
- *Sarazin, Essai sur les Hôpitaux. Bordeaux. 1865.
- Gallard, sur la Ventilation et Aération. Paris. 1865.
- *British and Foreign Medico-Chirurgical Review, 1860-1866.
- *Galton, Douglas, The Herbert Hospital, Woolwich. London. 1865.
- Gordon, Visit to the Paris Charities. London. 1866.
- Trélat, Les Hôpitaux, &c. Paris. 1866.
- *Dr. Knapp, Die Krankenhäuser bes. Augenkliniken. Heidelberg. 1866.
- *Rommelaere, Dr., Les Hôpitaux et Institutions Hospitalières. Brussels. 1866.
- Comptes Moraux de l'Administration Générale de l'Assistance Publique des Indigents à Paris. 1818-64.

Hart, E., Address to the British Association, 1866. British Medical Journal.

*Jacquemet, Des Hôpitaux et Hospices. Paris. 1866.

*Vernois, M., The Copenhagen Hospital: Annales d'Hygiène, 1866.

*Bericht über die k.k. Rudolphstiftung. Wien. 1866.

*Gazette des Hôpitaux, No. 67. 1866.

*Zeitschrift sur Biologie. München. 1866.

*Lefort, L., Les Maternités. Paris. 1866.

PART I.

I.—ON THE CONSTRUCTION OF HOSPITALS.

1. *Dimensions of Hospitals.*

FORMERLY large hospitals were founded on the principle that by increasing the number of patients who could be accommodated, the benefit conferred on the sick poor of the community was also increased ; but in recent times contrary views are strongly maintained. Large hospitals are described as unhealthy and dangerous to those who seek recovery of health in them. It is stated that a great many sick people living together under one roof engender certain diseases which are well known under the term of hospital diseases. I allude to pyæmia, erysipelas, gangrene, puerperal, typhoid and similar fevers.* That the dangers in question exist, is evident from the history of hospitals, especially large hospitals, where, of course, the resulting calamities are greater, and by the reports a better record is preserved than in smaller establishments. Although it is very difficult to prove by statistics that large charities offer less healthy conditions than smaller ones respecting the point in question, yet the fact that all hospitals are liable to such dangers, leads naturally to the conclusion that the evil consequences must be more deplorable in the large establishments. A greater number of people are likely to fall victims, and the whole neighbourhood is more endangered, by the hospital being a large focus of disease.

It follows on the same grounds, that should any infectious disease be accidentally brought into a hospital, the number of people who run the risk of catching it increases with the size of the building, and the best remedy against evil results which exists—that is, by completely emptying, and, for a time, closing the establishment—is the more difficult to apply the larger the number of inmates.

I can bear testimony to one fact, that the hospital air of large establishments, without actually leading to disease, tells upon the constitution. I observed that my colleagues who resided with me in one of the largest charities (Charité Hospital), lost their fresh com-

* No metropolitan general hospital can boast of having had no cases of hospital disease during a period of ten years.

plexions after staying there for six or eight months, and that they regained it after leaving and living in the town for a time.

In favour of large hospitals, it may be urged that they offer great facilities for clinical instruction, and some of them have obtained great celebrity in this respect. But, on the other hand, there are some smaller institutions in existence which receive, almost exclusively, clinical cases, and are quite sufficient for the purposes of medical education.

It might further be said, that recent improvements in the construction and management of hospitals may be expected to reduce the dangers arising from hospital diseases to very narrow limits ; but our experience on this point dates from too recent a period to be conclusive, and to trust too much to good arrangements would be presumptuous.

I do not think myself entitled, with our limited experience, to mention an exact number of patients that on no account should be exceeded ; but whenever a new hospital is to be erected, the danger of having too many sick people under one roof, or living close together, should not be lost sight of, and moderate dimensions insisted upon. In large cities, to have only small hospitals would be inconvenient and a useless expense.

Besides the sanitary principles, we have to regard the actual wants of the population for whose benefit the hospital is founded ; and although there is a great number of sick poor, only part of them can claim in-door treatment.

Further researches ought to throw more light on the point, but I do not think I am far wrong, when I state that for every thousand inhabitants the hospital ought to have four beds for the sick poor. If this is right, a town of 50,000 inhabitants need not have a hospital for more than 150 patients, supposing there is a Union infirmary for fifty beds. It must be borne in mind that a part of the surrounding country relies upon the town. In London there should be accommodation for 12,000 poor patients. A hospital containing 400 beds would amply suffice for the wants of a surrounding population of 100,000 inhabitants, who are distributed over a large area. But the hospital, if not exactly in the centre, would still not be inconveniently situated. If the area be larger, those of the sick poor who live farthest away from the building find some difficulty in being conveyed to it. It has further to be considered what other institutions afford relief to the sick poor of the district or town ; for instance, if many poor are sent to a convalescent institution.

It is important that all the points mentioned are considered

beforehand, and that the building has the right dimensions at the commencement. To enlarge hospitals is, in general, unadvisable. It was frequently done formerly; but unless the eventuality is foreseen and considered in the original plan, it leads to faulty arrangements and dispositions.

2. *Site—Town or Country.*

There is sometimes a difficulty in selecting a proper site for a new hospital. As it is intended for the local wants of a certain district, nothing seems more natural than to have it in the centre of that district; but to this there are objections, on sanitary grounds, especially in large towns. In small places, the hospital, even if removed from the centre of business and life, can hardly be at an inconvenient distance for the patients. But it is otherwise with large cities like London, Berlin, Vienna, or Paris, and there have been warm discussions on the matter. What can be said on the subject, I believe I may sum up by considering the following points:—

1. The general healthiness of the locality. 2. The easy accessibility for patients and others, who visit the hospital. 3. Convenient position for clinical instruction. 4. Cost of erection and maintenance.

Ad. 1. It can hardly be doubted that in general better conditions for health are found in the country than in a large town, and I would not say a word more about it if this had not been disputed. Not to speak of statistics of mortality, which are in favour of country districts, I first mention the well-known fact that the country is in general considered a health-resort by townspeople, and frequently recommended by the profession as such. Purity of air consists principally in the absence of such impure exhalations and bad smells as are produced by the overcrowding and industrial occupations of large cities. The air is always purer, and less liable to become stagnant in the country, whereas the immense extent of buildings in London and other large towns arrests to some degree the free circulation of the atmosphere.

Now it might with some reason be said that the air gets vitiated in *any* hospital, wherever it is situated; that hospitals breed a noxious atmosphere of their own, owing to the number and condition of their inmates; but then we have every reason to suppose that the surrounding healthy country air is a better agent for restraining this evil than town air.

Ad. 2. If we consider the convenience of the patients themselves, we might at first sight be induced to believe that town hospitals are far

preferable. It would be in many cases quite impossible to remove patients suffering from severe injuries, or from fever, even to a moderate distance, because they might die on the road, or in consequence of removal. On the other hand, we find a great many patients are admitted into central hospitals who live at a distance of three or four miles from the building. As regards the friends of the patients, I should not think it a great drawback if their visits were to be curtailed by the distance, because those patients who are dangerously ill are better left alone, and those who are convalescent make friends in the hospital. Besides, in large towns every one gets used to distances, and country hospitals would be in most cases accessible by railways. In the Berlin Charité Hospital, which lies at some distance from the centre of the town, the visits of the patients' friends were so numerous on Sundays, that they had to be prohibited, and a week-day appointed.

Other persons who have to visit the hospital are the members of the committee, the physicians and surgeons. If the management of the hospital is vested in a committee of unpaid gentlemen, who meet weekly or fortnightly, as is mostly the case with London charities, I have serious doubts if it would be preferable to have the establishment in the country. Although the sense of the public duty they have to fulfil is happily very strong in these members of committee, yet it might, under adverse circumstances, be found a little too onerous to meet frequently. A remedy for this would be central offices, to which there are other objections. As regards the medical officers, they do not live in the country, but in town, and generally in the most central parts of it, because they must be easily accessible to private patients, who live all over the large metropolis. They would therefore have to sacrifice more of their time to the hospital if its site were some distance from their residences. Some of them would perhaps find themselves compelled to sacrifice their hospital appointments to their private practice, on account of the distance; but there would always be many eminent men left to supply their places.

Ad. 3. I have no doubt that a central position commends itself more for clinical instruction than one at a distance. Some bring forward as a reason why the science of medicine might be better studied in a country establishment, that the students are removed from the temptations of the town, and that they will bestow more of their time on useful labour. But then you might answer that hitherto students have not been led astray by the attractions of the gay life of large towns, but are in general well-conducted, industrious, and much intent upon acquiring scientific knowledge, and

that the dulness of country life would not improve their intellect ; besides, if they live within the hospital walls in town, they are as safe as in the country. But the real importance of a central position lies in the opportunity afforded to the students of availing themselves of the public libraries and museums, and finding everything they want for scientific purposes within easy reach.

The professors of medicine and surgery would certainly prefer a central position for the hospital and school of medicine.

Ad. 4. The cost of building-ground must be considerably less in a place remote from town, and therefore the expenses will be reduced. But the price of building materials does not differ in town or country ; the expense of conveying them to the latter is possibly higher.

The price of food, medicines, coals, &c., with which a hospital is supplied, is most likely less in the country, or at least not higher, if they are supplied by contract, as is generally the case in England. But where a central board provides them, and they are kept in central depôts, as in Paris, the cost of conveyance makes some difference. The hospitals nearer the depôts are supplied at less cost than those at a distance.

Wages and salaries are more likely to be higher in town than in the country, and the cost of maintenance in general is found less in the latter than in the former.

Only a few years ago these points were discussed in learned societies. The Chirurgical Society of Paris, after lengthy debates, came to the conclusion that only small hospitals for urgent cases, and those required for clinical instruction, should exist within towns, and that not only would the salubrity of the larger hospitals be improved by their extra-urban position, but also their construction would be rendered more economical by reason of the reduced cost of land. Granted that these principles are theoretically right, as I think they are, supposing always that the hospitals for clinical instruction are really allowed in sufficient number, I do not see the possibility of strictly following them up everywhere in practice. The central establishments of London could not be removed into the country ; and supposing they were, I am afraid they might, in the course of time, become the centre of a densely-populated neighbourhood, because a hospital is likely to attract a great many who settle near to it. There is no doubt that most London hospitals have not a site that is in accordance with the principles advocated by the majority of the profession in this and other countries at the present time. (*See p. 115.*) It may, however, be supposed that the consequences of this would be more seriously felt if London was more an inland city than it is.

Other Features of Site.

To construct the building in such way that the front or longest side of a ward face the north or north-east would be a mistake, because on this side the cold and the wind are most felt. Rain comes most from south-west, and south-east seems therefore preferable. If one side looks south-east, the other faces the north-west, and this seems to be the best position, except in the case of wards for diseases of the eye, where the patients require as little sun as possible. Their wards may lie northwards, but all other patients want light and sunshine.

Under no circumstances should the site of a hospital be where fever is endemic or epidemic (*see* Milan Military Hospital), near river deltas, or where the soil produces miasma. The neighbourhood of sewers, especially open ones, rag merchants (rags containing sometimes contagious matter), bone-boiling, gas-works, chemical or large factories in general, and places where there is much noise and bustle must be avoided, because patients make a better recovery where the locality is quiet. It is advisable to build a hospital on elevated ground, so that its architectural beauty is conspicuous to the eye, that the patients enjoy a view over the country, and that it may be above the bad smells, if there are any, and in purer air. It should not be so elevated, however, that it is reached with difficulty by carriages or visitors, but on gently sloping ground near a placid river, in a position where the soil is fertile, and surrounded by large grounds.

The foundation of the building should be in dry ground, or the moisture will ascend in the walls and make them damp. There should be good drinking water in the neighbourhood.

When a committee has decided on the erection of a hospital, they should obtain the advice of a leading member of the medical profession regarding the site and other important points to be mentioned hereafter.

3. Exterior of a Hospital.

There is a middle course possible between extravagant splendour and shabbiness of the exterior of a building. A hospital is principally a useful institution, and the architect must not lay too much stress on a captivating outside. A palace may have many columns of marble or granite, projecting balconies, and towers, but a hospital should aim at more simple attractions. It may look pleasing without such a profusion of ornaments as are presented by a Gothic church, and imposing even when constructed on plain principles. Whatever may be the style of architecture—Gothic, Italian, or mixed—I should not object to a fine clock-tower and an ample porch; the chimneys need not look ugly, and narrow entrance-doors

can be avoided. The architect ought to dispense with arched windows; a little stained glass in the chapel is not very expensive. Simple iron railings may surround the building at some distance, and there need not be an entrance looking like a triumphal arch. The material of which the walls are built should be good bricks, and the architect may avail himself of Portland stone and terra-cotta. If the walls are to be plastered it is better to leave that until about a year after the completion of the building, for the walls to get thoroughly dry; and it is better to plaster or cement them first inside and then outside, because if the outside is left open to the drying action of the atmosphere the inside walls retain less humidity.

Rain-gauges and water-pipes ought to be placed in proper positions, the latter not exposed to the frost, but secured against it by Portland cement.

4. *Drainage.*

This is an important question. A great many towns have now a system of drainage, by which the refuse is removed and used as manure in the country. If the hospital is situated in a place where this system is in action, its refuse is carried off like that of other buildings; but where sewers are not available, the hospital has its own cesspools. In the first case, the hospital drains are brought into connexion with the main drains, and made of the same material as the latter. Cast iron is the best, but expensive; brick or brick-cemented drains occasionally get broken, and let the fluid escape. If the place where the breakage happens is near a well, this gets contaminated with organic impurities. Salt-glazed stoneware drain pipes, although good in themselves, are liable to break. They are, however, generally used.

All drains should be laid to a depth that will prevent them from being frozen in cold weather, and should be constructed in the outer walls of a hospital, and not run underneath it, for with the greatest care it may happen that they will require repairs, and the joints do not always fit air-tight, so that sewer gas may escape.

The latest plan for ventilating drains is by having the vertical drains into which the pipes take the refuse from the water-closets and sinks open at the upper end, where a charcoal box with a perforated bottom is placed, or ventilating pipes are carried to the top of the chimneys.

Drains are cleansed by flushing. For this the channel is blocked at the lower end, and large quantities of water admitted into the upper one. If the impediment is removed, the water rushes with great force through the vacant space, and carries off all impurities.

Where no sewers exist, the hospital has generally a cesspool. (See

pp. 107, 157.) If the building exists near a river, the refuse could be discharged into the latter; but this should be avoided, because it renders the river offensive. Cesspools ought to be water-tight, with an overflow pipe; foetid emanations are avoided by syphon pipes. Cesspools are emptied of their contents as often as is necessary. Generally some means are used for deodorizing them: the best plan is to have layers of charcoal at the bottom. Another device is to carry the refuse into tubs, which can be removed; and they might have double bottoms—the upper one containing numerous perforations, so that the fluid and solid excreta are separated.*

5. *Plan of Building—Shape of Hospital.*

Hospitals are built on different plans, and it is not necessary that they should be all constructed on one uniform plan. Although more than one plan is admissible, there is no doubt that recently one system of construction finds more favour with the public than all the others—viz., the Pavilion plan. Some authorities in hospital matters still uphold the Corridor system; and the desire to produce something new, causes architects occasionally to build on plans deviating from the common ones. Sanitary principles alone should influence us in the selection of the plan.

I must first mention that some buildings are constructed on no system or plan whatever. We find in many instances private houses converted into hospitals;† in other cases they have been formerly palaces,‡ convents,§ or, worst of all, barracks.|| It was not rare formerly to take buildings for hospitals which were unfit for anything else. This may be economical, but the hospital can never be healthy. If you throw two rooms into one by taking down the partition wall, you generally get a ward of irregular shape, with recesses and corners, which are difficult to ventilate. The plainest sheds are preferable to them, and to magnificent palaces, if they are only constructed on proper principles.

Of all systems those are the worst where there is the least of air and light. Those hospitals which stand round closed courts offer consequently the worst conditions of health. How it happened that so many buildings¶ were constructed on this plan I think may be easily explained. In the first place, many of the institutions were

* A novel plan for draining a town is that adopted at the Hague. Air-pumps are used to extract the air at certain places, and the refuse rushes to occupy the vacuum, as soon as the valves, which prevent this, are removed.

† Samaritan Free Hospital.

‡ Dresden.

§ Rome.

|| Indian Hosp.; some German military hospitals.

¶ Salpêtrière, older portion of Guy's, Venice, Vienna.

in connexion with convents, which generally were built after this manner; it was possible to accommodate a great number of patients in such hospitals, and as one court was added to another, the expenses were less than for separate or semi-detached buildings. Besides, this style of construction always found friends in the sunny south, where they like to exclude light and air: and it was afterwards imitated in other countries.

If the wards of such buildings have opposite windows, they are certainly less dark, and more easily ventilated than where a corridor runs along the whole of the inner side. This is convenient for the servants and nurses, but not to be recommended for the patients.

I do not consider the dangers resulting from connecting passages imaginary, because it is well known at present that contagious matters spread in a horizontal direction. (*See* p. 15.) Interposed glass doors do not sufficiently break the communication, but interfere with ventilation (especially where the latter is effected by windows at both ends of the corridor). Under some circumstances the evils of the Corridor plan may be reduced to narrow limits; for instance, where the hospital is small, the corridors being short and well ventilated (Westminster Hospital).

Between the plan of closed courts and that one where the wards receive as much light and air as is possible, there are many others, which I will mention briefly, because they are illustrated in the second part of this work.

The plan of a circular building* is as bad as the closed quadrangle. A better one is, where one side of the court is open.† There the air is less stagnant, because the wind can sweep through from one direction. The wings and centre may form one long block; this is better still.‡ They may assume the shape of the letter **H**,§ where the administrative part is in the centre, having the wards for males on one side and those for females on the other. The hospital may be built in such a shape that the letter **L**|| or **T**¶ is formed; and in both cases staircases may break the communication of the different parts forming the whole.

Several plans may be combined; but in no case can the free circulation of air, which is necessary to keep the hospital healthy, be more favoured than in the Pavilion plan. Here each block forms a hospital by itself, and yet is connected with the others. The

* Vienna, old lunatic asylum.

† Manchester Royal Infirmary, Hamburgh Hospital.

‡ Bremen Hospital, Zürich Hospital.

§ Middlesex Hospital, St. George's, Leicester.

|| Sheffield, Royal Free.

¶ Montrose; Oxford, St. Mary's Hospital.

dangers of hospital diseases are much abated, and the judicious separation of patients much facilitated. All the wards are light and airy, the officers and nurses are more protected from hospital diseases than under any other plan, as they do not live under the same roof with the patients excepting when on duty. The wards are large and easily superintended, and they ought to be healthy. As regards this latter point, the expectations founded on theoretical deductions have not been quite realized, at least not by one of the principal representatives of the plan—Lariboisière. Further experience will decide it satisfactorily, as many hospitals in this country have been recently built on the plan.

The pavilions should stand far apart (at least 100 feet), and as regards their position to each other much depends on the building-ground; they should not necessarily stand parallel, and need not be connected by straight corridors, but these may be curved. (Boston Free Hospital, p. 86; Copenhagen Hospital; proposed Swansea Infirmary.)

Objections to the Pavilion Style.

I have to answer a few objections to the system of separate blocks. First, some say it would not do for small hospitals; but they have only to look at the plan of the Bucks Infirmary, or Surrey County Hospital, to be undeceived in this; they contain only fifty or sixty beds, in two pavilions built in one line, but intersected by offices and the staircase.

The costliness of construction is another objection. Now, to prove the costliness, the hospital Lariboisière is always referred to, which is alleged to have been constructed with unprecedented and unjustifiable prodigality. It is quite true that the construction has cost nearly 400,000*l.*; but this is explained by the interference of the Municipal Board, which retarded the construction at the commencement, by the change of the original plan, and caused an additional expenditure of 20,000*l.*; by the quality of the soil, that made it necessary to build the whole on arches; and by the new systems of heating and ventilation, which cost nearly 20,000*l.* The ground alone cost 125,000*l.* There being 612 beds, the cost for one would be near 640*l.* This is certainly very high, and I cannot find any other establishment which comes near this sum; even King's College Hospital is much behind (400*l.* per bed); but it is partly explained by exceptional circumstances. If we compare this with the expenses of other hospitals built on the same plan, we find that they can be constructed at a very moderate rate. As one instance, I may mention the recently-opened Chorlton Pauper Hospital, where, according to the official report, the cost for one bed is only 66*l.* (See *Lancet*, Oct. 13, 1866.) If it is possible to construct a workhouse

infirmary after the Pavilion plan, I hardly think that any one will consider the costliness of the system so very great an objection.

It might be urged that isolated buildings are not fit for a cold climate; but then thick walls and plate-glass or double windows will remedy this; and also that the officials lose much time by the distances they have to walk in the building; but this is compensated by other advantages.

As yet, as will be seen from the description of the hospitals, the block system has not been generally adopted on the continent, where comparatively few hospitals on this plan exist.

Relative position of different parts of the Hospital, and distribution of Patients.

Whatever plan is adopted, there are some general rules to be observed regarding the position of the different requisites and the inhabitants of the house.

First, the offices for administration, the sleeping-rooms of officials, medical men, nurses, &c., must be separated as much as possible from the wards.

It is quite enough that the said inmates of the establishment are exposed to the hospital air, and contagion by diseases during the daytime or office hours: they must, at least, be as much as possible protected when they are off duty, and at night. (*See p. 145.*)

Secondly, the kitchen must not be in the basement or ground-floor, but quite separate, connected with the main building by a corridor. Otherwise the smell of cooking pervades the house.

The engine-room should be in a separate shed; washhouse and dead-house should be detached.

Male and female patients should be accommodated in separate parts of the hospital, divided by the principal yard; and they should not use the same day-room, as is sometimes the case.

6. Water Supply.

In a hospital we want good pump-water for drinking, and soft water for cleansing, washing, bathing, and cooking. Pump-water is not always of good quality; it is often impure, containing sulphate of lime, iron, or magnesia, or acids; therefore it should be analysed by a competent person, and if not found satisfactory it should be fetched or supplied from a distance.* (*See p. 108.*)

Water may, moreover, become the carrier of contagion, and this should not be lost sight of. The spread of cholera at the East end of London was referred by many hygienists to the water supply. It has often been found that fever was originated by pumps which sup-

* See Hill Hassall, Parkes, Pappenheim.

plied water impregnated with gases and matter escaped from broken sewers. The pumps should never be close to sewers, water-closets, or church-yards.

Water must be supplied in sufficient quantity for the sick in a hospital. Fever patients drink a great deal, and want cold water, which should be fetched from the pump frequently. But pipe-water is also used, for instance, in the sculleries—hot and cold. It is therefore necessary that hot and cold cisterns are in the house, from which the pipes take the water to all the places where it is wanted. Where companies undertake to supply private houses, the hospitals are supplied by them also; but where this is not the case, the water is pumped from a well into the cistern. The water in the hot cistern is usually heated by the steam obtained from the engine or boiler in the basement, and the steam-pipes form coils at the bottom of the cistern.

The best materials for cisterns are iron or slate. Lead is not recommended, because the water dissolves and absorbs the metal. Zinc lining is objectionable; it is not durable, and crumples up by the heat of the sun; cement has been tried in tanks, but the water becomes hard. The cement is insoluble in pure water, but water containing acids will act on the lime which forms a small part of the cement. Rain-water, as such, does not contain any acids, but on passing through the air it readily takes up carbonic acid, which is always present, and sulphuric acid, which is frequently met with in the atmosphere above, and in the neighbourhood of large cities. As slate is too expensive for large cisterns, iron is preferable for those of larger size. It can either be painted with a patent colour, or, what is better, be galvanized.

Hospital cisterns must be cleansed thoroughly from time to time, therefore they must be accessible. They should be placed as far as possible from any drains, not just above the closets. Charcoal filters are very good to keep the water pure from organic matters, but they must be frequently changed.

The pipes for distributing the water in the hospital are of lead, as they are in private houses. There is not so much objection to this as to the cisterns being coated with lead, because the water is never in the pipes for any length of time. Lead is the cheapest material, and iron or zinc would make a great difference in the cost. It is of some importance that water-pipes are placed and encased properly, when the buildings are constructed. They should be secured against freezing in cold weather as much as possible; this is often neglected in this country, where the frost is usually of short duration. If the water freezes, it expands; by this a leak is caused, and the water escapes through it when it begins to thaw.

The exposure of the pipes to the open air might certainly be avoided; they might run in a recess of the wall, and be partly encased by wood. But it is safer to encase them in the most exposed places with cement. They must not run through walls without being encased, because they cause dampness. As they are cold, the vapour which is in the wall is condensed near them. It would not do to place them in the smoke-shafts; they must be accessible, because they may want repairing. If in hospitals the pipes are originally badly placed and exposed, it is necessary, should the weather become cold, to wrap them up with flannel or cloth, cover them with manure, or keep the water running by allowing a tap at the bottom to be partly open; should they freeze, the exposed parts must be bathed with hot water, &c.

As regards the quantity of water which should be supplied per head per day, it is difficult to state it accurately. It should be ample—about 50 or 60 gallons. The average of the water supplied per head per day in the Paris hospitals is 50 gallons. The quantity consumed in large cities per head is very variable: in Manchester it is stated to be 14 gallons; in London, 32; in Glasgow, 60; but it is said that there is no good supervision in the latter place. The present regulations for lodging-houses in the metropolis require 25 gallons. As regards hospitals we must not forget that besides baths and the usual wants, there are the drains, which it is advisable to flush frequently. Nothing is better for preventing the ill effects of noxious gases.

7. *Elevation—Number of Floors.*

There are certain reasons why we should avoid having more than two floors in a building intended for a hospital. It is well known that the air in a hospital, as in a private building, ascends from the lower to the upper floor; for instance, we find when the kitchen is in the basement, that the smell of the cooking gradually ascends to the upper stories. From this we conclude that the air of the lower wards finds its way into the upper ones in a similar manner, and this happens in a far less degree in an opposite direction, viz., from the upper to the lower stories. It would follow from this that the air in the upper wards must be more close and less healthy than in the lower floors. In fact, it is often found, and I have noticed it frequently, that the air is sweeter in the lower floors. It is, however, not proved that the patients make a better recovery in the latter, but the views on this point are conflicting.* It is known that organic contagions proceed in a horizontal direction,† and certainly science

* J. Simon, who found that surgical cases recovered as well in top wards as on the lower floors.—*Reports of Public Health*.

† Latest cases of small-pox in King's College Hospital.—*Med. Times*, Dec., 1866.

is not far enough advanced to show by analysis that the air of one part is more pure than that of another. Much depends upon other circumstances, such as the price of the building land, &c. In places where land is comparatively cheap, the building may cover a larger space, and may have less elevation. As regards the administrative arrangements, they can be carried on most efficiently where the least number of floors exist. But if the hospital is large, the advantage of not having to ascend so many stairs is counterbalanced by the distance the medical men, attendants, &c., have to walk over to perform their duties, and lifts in a great measure overcome objections that are raised against lofty buildings. In fact, it will generally be found that the best plan is to give additional height to those parts of the building where the offices are situated, and to have fewer floors in that portion devoted to clinical patients.*

8. *Stairs and Passages, Lifts and Linen-shoots.*

A fine and spacious entrance hall is a great ornament to a building, but there are other reasons for having it in a hospital. The hall forms a reservoir for fresh air, which from hence finds its way into the wards. The stairs should be of stone with iron balustrades, fire-proof, and tolerably wide—first, because they are used by many persons at one time, who must have room to pass each other; and also because they must afford space for carrying up the patients.† The steps should not be steep, and, as carpets are too expensive, covered with matting.

A few plants in the hall and on the landings give them a more cheerful appearance, and impress the poor patient favourably when he first enters the hospital.

As regards passages, they should be of a convenient width (9 to 11 feet), and ventilated by end-windows; and warmed in winter-time as will be explained in another place.

Lifts are used for raising food, medicines, clothes, &c., and their usefulness is beyond doubt. They are raised by turning a handle, in smaller buildings; water-power is sometimes used. As regards patients, lifts are necessary in consumption hospitals, but I should not consider them of paramount necessity in general hospitals; they are even not much used where they exist.

* We find one floor in the London, Glasgow Fever, and Milan Hospitals; two floors in Guildford, Vienna, Dresden; three floors in the London Hospital, Guy's, Necker, Beaujon, Lariboisière, Berlin Charité, Bethanien, München, Frankfurt; four floors in St. Bartholomew's, St. Mary's; five floors in Glasgow, and Adelaide Hospital, Dublin.

† Here I mention, *en parenthèse*, that I have sometimes seen patients carried up who groaned from pain caused by the uncomfortable chairs which the porters use in some establishments.

Linen-shoots of earthenware, which may be also used for the dust, are much to be recommended. As they are placed close to the wards all dirty clothes and linen can be removed easily, and at once, to a place where they can do no harm.

9. *The Sick Ward.*

The arrangements of the wards require our earnest attention. Their dimensions and the furniture they should contain must be principally considered.

We want large and small wards; the first because they are more healthy than many small ones, and the cost of their construction is comparatively less; and moreover, supervision, attendance, and cleaning are more easy. The wards must, however, not be too large; they may by this become uncomfortable to the patients and difficult to superintend. A number of about 30 beds, sometimes a few more, sometimes a few less, is now generally considered as most satisfactory in every respect.

The door of such a ward should not be narrow, but of a convenient width, so that you may pass in or out comfortably, and patients can be conveyed through on brancards without being in danger of coming into collision with the door-frame. Swing-doors are generally preferred. The necessity for a louvre over the door will be considered in the chapter on ventilation.

As regards the windows, they should be opposite, along both sides of the ward, and no ward should be considered to come up to the standard of modern improvement unless this is the case. It is further advisable to construct the windows in such a manner that each bed stands between two windows; it is better that the beds should be separated by, and receive light from two, windows. It may, however, not always be convenient to have so many windows in the building, and sometimes there are larger and wider windows which allow two beds to be placed between a pair of them. The windows should be high, extending nearly to the ceiling, so that the upper strata of foul air can easily find their way out when the windows are lowered a little. They should reach nearly to the floor, else the patients do not breathe the air unmixed with that of the ward, when the lower sash window is raised in mild weather. A distance of three feet and a half or four feet will be found convenient.

Iron frames are more durable than wood, but the frames of sash-windows are of wood, and this form of window should always be preferred for wards. The French *croisées* are immensely inferior to them as regards ventilation. To this I have referred more minutely in another place (p. 31).

The shape of the wards depends almost entirely upon the plan on which the hospital is constructed. I append a drawing which shows the forms of the wards of existing hospitals. The manner in which doors and windows may be placed is so evident, that it can be understood without explanation.

As regards octagonal wards (Fig. 8), they are mostly for convalescents; bow-windows, as in Fig. 7, are very rare; spinal walls, by which a large ward is divided into two (Fig. 9), are objected to because the wards on this plan are not so easy to ventilate. Compound wards (Fig. 10) are the worst. They existed in the Hôtel Dieu, which is now in course of reconstruction, and in some hospitals that had been formerly barracks. The wards are dark, open into each other, and offend against every sanitary principle.

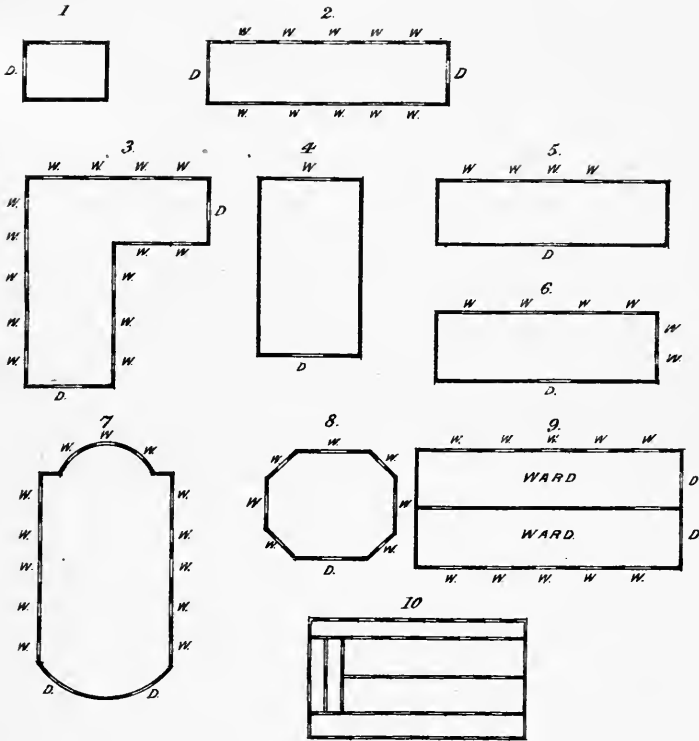
The height of a ward in this country should be about 15 feet. Lofty wards generally contain pure air; but if the ceiling is too high the ward loses the dimensions of a dwelling-room. In warm climates the height should be a little more than with us. The width need not be more than 26 or 28 feet, because we want only two rows of beds. The length should correspond with, and not be more than four times the width.

As regards the walls, we sometimes find them merely whitewashed, without being plastered; this is the cheapest plan, and perhaps the most healthy. They can be plastered and whitewashed, but as plaster retains contagious matters, they must be whitewashed over at least once a year. They may be oil-painted, and the paint can be on the bare bricks, or on the plaster with which the walls are coated; in the latter instance, the painting must not be done before the plaster is perfectly dry; this may be supposed to be the case a year after it has been put on.

Lastly, the walls can be coated with cement: sometimes Keene's cement is used, which is of two different qualities: sometimes Parian cement, but this is more expensive than Keene's. As far as I can judge, they understand the use of cement better on the continent (in Munich and Paris), than they do here, for the walls there are never blotchy. It is questionable if cemented walls are the most healthy ones. (*See Ventilation*). Cement can be either white, or coloured and polished. These different ways of covering the walls can be combined.

The flooring of wards should be impervious. Firstly, because it deadens the sound of people in a ward overhead; and secondly, because it does not retain impure matters. On the continent often gypsum is used; here it is generally concrete. In order to make the floors as fire-proof as possible, the beams which support them should be of iron: we need not be afraid that they will be too heavy.

Fig. 1.



SHAPE OF WARDS AND DOUBLE-WARDS.

D Door ~ *W* Window

- | | |
|----------------------------|----------------------------|
| 1. Bradford Eye Hosp. | 5. Manchester R. Infirmary |
| Leicester Infirmary | 6. Bradford Infirmary |
| 2. { Hants County Hosp. | 7. Guys Hosp. clin. wards |
| Glasgow Surg. Hosp. | 8. Bristol Gener. Hosp. |
| 3. Guys Hosp. | 9. London Barthol. Hosp. |
| 4. Bremen, Rotterdam Hosp. | 10. Indian Hosp. |



The flooring may be of oak, which absorbs less water than any other kind of timber. Parqueted floors are most common on the continent; they are much to be recommended, and look exceedingly nice and clean. The blocks of wood are grooved and tongued together, and sometimes what is called keyed. The same thing is seen in wooden blocks for woodcuts. The floors are beeswaxed and polished.

To keep a wainscot or parquet floor in good condition, a frotteur is wanted, who comes to repair them every three or four weeks; they are also polished by the servants every day.

Floors may be varnished with a compound of linseed oil, turpentine, and gold ochre.* This is the Berlin plan. These floors look dark and somewhat greenish; they are cheaper, but less durable. Old floors, which are of plain deal, can be varnished; and the process improves them much. They must, however, be frequently revarnished. In this country boiled linseed oil is generally used. Cement, or brick floors, as frequently found in warm climates, should not find favour with us (*see* Oxford, p. 145; Stevens', p. 162); they occasion colds, and are not comfortable, especially in cold weather. This objection does not apply to corridors. They may have tiled floors (p. 107).

10. *Small Wards.*

They are necessary in an hospital, for there are irritable patients who do not feel comfortable in a large ward; there are those who do not find the distribution of meals, and the visits and medical rounds a matter of diversion, but are annoyed by it, and thus their recovery is retarded. Nervous patients, and convalescents from fever, prefer to be alone and quiet. Contagious patients must be separated from the others. Those who suffer from delirium or mania cannot be left in a large ward with other patients, and sufferers from cancer or gangrene are quite unbearable to their fellow patients. Persons who belong to the better class of society, but have become hospital inmates by accident, feel thankful if they are removed to a side ward, where they are alone, or only with one or two others.

Small wards should, therefore, exist in general hospitals,† and pavilion hospitals should not be without them. As a general rule, one small ward can be annexed to a large one on each floor, and in some pavilions matters may be arranged differently, by cutting off more space for small wards.

11. *Waterclosets.*

In England, we rarely find a hospital without waterclosets, but

* See Newcastle Infirmary.

† See University College Hospital; Glasgow Infirmary; Rudolphstiftung.

on the continent latrines are very common. We should insist that no new building contains the latter. The waterclosets should be always well placed, in no way whatever but against the outer wall, in order that the drains do not pass under the building; the best means for ventilating them are self-acting windows. They should be kept scrupulously clean, and anything which promotes this, such as glazed tiles, or white paint, is to be recommended. It is important that the basins should be large (in France they are comparatively small), and that there should be a good stream of water for flushing them. I formerly thought enamelled iron preferable to earthenware, on account of its cheapness and durability, but I have observed that the enamel comes off, and therefore earthenware is preferable. It can be as well adapted to the seat as iron. A well-made basin of this material lasts, on an average, about fifteen years. Mr. Jennings' closet *à syphon* answers every purpose:* the double sheet of water impedes the return of gases. I need hardly mention those inferior apparatus where the basin has a rim to let in a convenient *couvercle*, or where the seat-cover fits air-tight. They are still in use in some establishments.

As there are no better means for banishing disagreeable smells from hospitals than the waterclosets, the expense should never be an obstacle to their adoption for a new building. But there are other objections raised against them, and they have even been abolished where they were used (Zürich). In places where it is very cold in winter time, the freezing of the water pipes is a great nuisance; and there is some difficulty in protecting them from the frost, if it lasts a considerable time. Nevertheless, the inconvenience caused by the bursting of the pipes, and the flooding of parts of the building, if unavoidable, should be endured, rather than abolish the waterclosets.

As regards self-acting closets, I have found them so often defective, that I think the others preferable. All waterclosets should have lobbies. The closets can be warmed by admitting air through gratings in the flooring and hot-water pipes placed under the boards; but where I found means of warming, they were in the lobbies (at Beaujon, Guildford, Herbert Hospital). There is some difficulty in keeping the lobbies warm, as the closets must have the windows open, and it may be urged that there is no better prevention for bad smells than a low temperature. Clinical wards, however, and consumption hospitals should have some means of warming the lobbies, in order to prevent the patients from catching cold. For small hospitals a fireplace will be the best, for large wards water-pipes may

* They are free from all machinery. No wires, cranks, levers, regulators to get out of order—the basin, valve-rest, and trap being complete and in one piece.

be used; and I think it might be arranged that an air-current caused by a fan passed over or through the pipes, in the direction of the closet. (See Fig. 2.)

12. On Lavatories.

They should be found in hospitals, infirmaries, and dispensaries.

The basins should be of glazed earthenware; enamelled iron is less to be recommended, as the enamel comes off in the course of time. Basins drained through a small plughole have many objections. The water runs off slowly, the chain is liable to break, and the plug is sometimes found sticking to the hole.

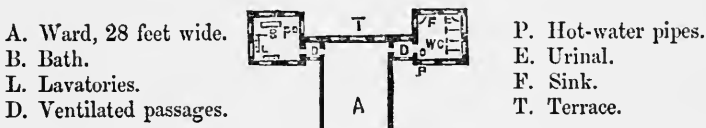
The best are tilt-up basins on Jennings' principle.* As the contents, after use, are thrown direct from the basin by tilting it, the drains are well flushed, and this is important from a sanitary point of view.

Hot and cold water should be laid on to the lavatories. It is more convenient to have a knob, by pressing which, with the finger, the water is allowed to rush into the basin, than to have a handle or cock which must be turned.

The slab should be of marble or slate, and there should be means of warming the place in winter time.

The woodcut shows the proper arrangement of water-closets, baths, and lavatories in a pavilion hospital. The rooms are separated from the ward by passages ventilated by opposite windows.

FIG. 2.



13. Ward Furniture.

Of course the principal article of furniture is the bed on which the patient rests. I do not think that in a newly-constructed hospital the beds are likely to be placed otherwise than with the head against the wall, so that the patients have plenty of light; but it is important to bring before our minds the reasons why any other position would be objectionable. If the bed is placed along the wall,† it is generally very close to it, and this is a bad arrangement; the bed should be removed about twelve inches from the wall; the latter might be damp, or there might be a draught from the window. If the beds are along the wall, it is more difficult for the nurses to

* Leeds New Infirmary.

† Zürich Hospital.

superintend them, and for medical men to examine and sound the patients. The number of beds depends upon the size of the ward; twenty-six or twenty-eight is a good number for a large ward.

The best material for the bedsteads is iron, because it is more durable than wood (p.161), and less apt to harbour vermin; a light-blue or green paint, although more expensive than a darker tone, should be preferred, because it looks much more cheerful. The bedsteads may stand on castors in the medical wards, but not in the surgical. They must neither be too high nor too low; certainly not lower than in most London hospitals, else they would be very inconvenient to medical men and nurses.* Dr. Uytterhoven mentions that he and his colleagues attended for whole days to the wounded during the July fights in Brussels (1830); that the beds were very low, and they had to stoop constantly, in consequence of which they were hardly able to keep upright when walking.

On the other hand, it is inconvenient to the patients if the beds are too high, because they find it difficult to get out. The usual length of a bed is six feet, or nearly so, and the width three.

Each bed is numbered, having a head-shelf (of tin) for this purpose, behind which a towel is suspended. The journal is placed over the patient's head. I do not think there is any great difference between sacking or iron bottoms: but the former are more generally used. There should also be a foot board.† (It is usually found on the continent.)

The best mattress is a spring mattress (pp. 164, 171), the springs being covered with horsehair at least two inches thick (*sommiers élastiques*);‡ but this is more expensive than any other arrangement: the springs can be protected from rusting by varnish. The surgical wards require other mattresses, with hard bottoms, water-beds, and various special contrivances. Horsehair is a better material for mattresses than wool, because it is more comfortable, keeps cleaner, and can be purified and disinfected by steam at a moderate cost.

Blankets are in general use. Feather beds are costly, unnecessary, and retain contagious matter.

Over the bed there should be a rope with a hand-grasp, near it a chair and side table, with, if possible, a marble top, the requisite utensils of earthenware. Instead of curtains, which interfere with ventilation and supervision, low screens, not higher than four or five feet, should be used whenever they are needed; their colour should be dark green.

* See London Fever Hospital.

† Bradford Infirmary; City of London Hospital for Diseases of the Chest.

‡ Lariboisière; Glasgow.

In the middle of the room there should be a long table, with a marble top, for holding all the necessary things. A sideboard, and a few easy-chairs, complete the furniture.

14. *On Lighting of the Wards.*

Many authorities still object to lighting sick wards by gas, as it vitiates the air of the room; they add, that wards need not be well lighted, and that oil lamps give sufficient light for the purpose. I would recommend gas, especially where it is provided by gas companies, as it is cleaner, cheaper, and gives less trouble to the servants. Oil lamps often smoke, their smoke being composed of carbon, carbonic acid, and carburetted hydrogen—very unhealthy gases. In this country an Act of Parliament exists which binds the companies to supply gas pure and free from sulphurous compounds. To prevent all danger to the sick, we have but to ventilate the gas globes (Argand's gas lamps); this may be done by a pipe ascending from the top of the globe to the ceiling, and communicating with the foul-air shaft; the air entering the globe carries off all poisonous products with it, and flowing upwards is removed from the wards, producing a continuous draught.*

It is absurd to contend that, because the gas supply might be accidentally cut off, oil lamps are to be recommended.

Should such an untoward event happen, the wards could be lighted by candles.

15. *Day and Dining Rooms.*

They are useful, and should be of convenient size. There should be one for males and another for females. They serve as common dining rooms for convalescents and light cases; and patients who conduct themselves properly may sit there and read, or otherwise pass away the time. A nurse should superintend them, and printed rules respecting the patients who use them be suspended on the walls. In this country complaints are rare about the convalescents, but in France they seem to be of a more lively disposition, and more inclined to all kinds of tricks, for which the meeting of a larger number of them offers a good opportunity.

16. *Baths.*

Are of two kinds—viz., moveable and fixed baths. The first run on castors, and are brought into the wards from the lobbies, or wherever they are kept, to be used by patients who cannot leave their beds for the bath-room. They are made of zinc or copper;

* Herbert Hospital; Chorlton Union Infirmary; Rudolphstiftung.

the latter is preferable, but more expensive. The baths are brought filled to the bedside, and afterwards emptied in the place where they were filled. The water should run off from an opening at the bottom, into the sink, which by this means is flushed.

Each ward should have a bath-room attached to it, where the bath is fixed in the flooring. The room should have means for warming and for letting out the steam. (*See pp. 125, 129.*) We find the bath made of zinc, or enamelled iron; the former is less durable than the latter. Marble baths are very rare in hospitals (Zürich); glazed tiles are very convenient. Glazed, polished cement is expensive. There is nothing that answers better than enamelled earthenware.* I have been informed that some sensitive patients do not like it; but I think baths of this description should be more generally used. They are cheap, durable, always look clean and tidy, and the water keeps warm in them. Each bath should be encased in wood; all bath-rooms should have impervious floors and the lower part of the walls tiled.

Common bath-rooms are as yet rare in English hospitals, whereas general hospitals on the continent are seldom without them. The number of baths varies with that of the inmates; but one bath for every twenty-five inmates would not be too many. The partitions between the single baths should be of enamelled slate. To prevent draughts we should have double doors and lobbies, and double windows are convenient, because they freeze less in cold weather.

Medicated baths should be near the common ones. Douche (ascending and descending), shower baths, Russian or Turkish baths, with tiled floors and comfortable ante-rooms, should also be found, on improved principles, in a general hospital.† There should also be a hot-plate to warm the linen.

17. *On Warming of Hospitals.*

The warming of hospital wards varies according to the habits of the country. We find the German stove in the hospitals of Russia and North Germany, the chimney in those of Britain and America, and various kinds of calorifères in France and Italy. Recently, many wards have been provided with hot-water pipes for warming, whilst into some others hot air is forced.

The German stove is made of clay and claytiles; the latter are white, or of various colours, and the stoves may be made either an

* Bradford; Leeds; Colney Hatch.

† I need scarcely mention the Japanese baths, which I recently found recommended in the *Medical Times* for small hospitals. The water is warmed by a metal box, open at the top, in which live coals are placed. But what becomes of the noxious gases, is not explained.

ornament to the room, or the reverse of it. As hospitals do not usually spend so much money on these stoves as is the case in private houses, we do not always find them models of beauty in the first-named establishments. If large, they interfere somewhat with the ventilation, the air becoming stagnant in the recesses where they stand, or in the space between them and the wall; and they take up cubic space which is lost to the patients. On the other hand, they seem indispensable in cold climates (north of the 54th degree), because by no other means are the wards heated so thoroughly, clay having the peculiarity of retaining heat a considerable time, and throwing it out gradually. The stoves form a large surface, from which the heat continually radiates. The fuel which the stoves require (wood or peat), is cheap in the countries where they are used, and is not required in large quantities, because it is consumed slowly. The smoke, before it passes on to the smoke-pipe, warms the clay of the stove, and, in order not to let it escape too rapidly, registers are used.

I here take occasion to oppose one way of building stoves, *i.e.*, through the walls dividing the wards from the corridors (Berlin Charité). It seems economical to have one stove for two apartments, but neither the ward nor the corridor can benefit by the arrangement, because so much surface heat is lost where the wall intersects the stove.

Iron stoves are less expensive than German stoves, and occupy less space; but they do not heat the ward so gradually, or for so long a time. Where you want to heat quickly, but only for a short period, you may use them. The heated cast-iron acts on the organic dust which moves along with the air-current, and causes bad smells, by decomposing it; besides, the air of the room gets too dry. The air, in order to recover its right hygrometric proportions, detracts vapour from less hygroscopic bodies, and this is the reason why we do not feel at ease in dry heat. It has therefore been tried to counteract this evil by putting vessels filled with water on the stoves; part of the water gets transformed into vapour and fills the room, but when the air of the ward gets colder, the vapour is again condensed to water. A better remedy is to heat the iron stove slowly. For this purpose the fuel is put in moderately, but frequently, but this is not convenient in hospitals, where labour is costly. Some of the iron stoves are furrowed, to offer a larger surface for the heat which radiates from them.

Clay and iron stoves have been combined, especially by putting a clay lining within an iron stove.

The remodelled firegrates* contain brick grates in an iron stove. The grate is of fire-brick, and the bottom partly solid, to check the

* Report on Barracks, p. 77.

consumption of fuel. The air is supplied from behind the grate and thrown over the fire; the smoke finds its way into a chimney which has no register. Behind the grate is an air-chamber communicating with the outer air, and the air, after becoming hot, passes into the room by a shaft cut out of the wall, and through a louvre placed at such a height from the floor that the patients cannot interfere with it. Where the stove is not close to the wall, but in the middle of the room, it is somewhat differently arranged, and the flue is descending. The objection against the stoves is that they sometimes smoke, but I think this is very rare. They are certainly expensive; some I have seen cost 30*l.*,* but they save a great quantity of fuel, and they ventilate the rooms.

The French calorifères are on a similar principle; they are mostly iron stoves surrounded by a brick mantle, and the air in the intermediate space is heated, but generally from the basement. The air enters near the floor, and ascends through upper apertures to the ceiling, and in this way some ventilation is produced.

The objections to chimneys are well known; the waste of fuel is considerable, as the greater part of the heat goes up the chimney. It is stated that only one-eighth goes into the room. Furthermore, the heat is unequal—viz., very great near the fire, and very inconsiderable at a distance. You often find an inconvenient draught close to the floor, so that you do not like to place your feet on it. Sometimes the smoke is blown into the room by the wind blowing down the chimney.

In favour of chimneys, it may be asserted that the wards need not be very warm, as the patients lie in bed, that they make the rooms look cheerful, and that they are very good means of ventilation, and keep the air sweet.

We find hospital wards and corridors rarely heated by steam circulating in pipes, because this has been found dangerous. The pipes have been accidentally broken, and the buildings damaged considerably. Although I do not know a case where fire happened in a hospital from overheated flues, yet I think there is more danger from fire by this than by any other means of heating. Another inconvenience is that the pipes get cold immediately the fire under the boiler is out.

Heating by hot air means that air is admitted which has become hot by passing over hot plates, or through an apparatus at a distance from the room or ward. It is either admitted by extracting the foul air, or by forcing it in (Van Hecke).† But the air is generally dry, and is for this reason unhealthy.

* Herbert Hospital; London Fever Hospital, New ward.

† P. 30.

Hot-water pipes are a very common means of heating buildings. This plan has not been introduced into hospitals more than sixteen or seventeen years. We find two different systems, as described under "Lariboisière," the most simple one being where no steam is used.

Both systems answer very well, as they easily warm the wards to 65° Fahr. and the cost of fuel is small. The Paris administration reckon that if they had open fire-grates, and the expenses for coals, instead of their calorifères, it would cost them 400,000*l.* more than at present for warming the hospitals. On the other hand, the construction of the systems is expensive; the stoves are no ornaments to the wards, and the pipes sometimes burst.

If they are heated moderately they never smell, but if excessively, the air gets dry and close-smelling. The latter must be partly owing to the dust on the pipes becoming decomposed; and this is the reason why they should be uncovered, however unsightly they look.

Whatever may be the means for warming the wards, the passages cannot be heated by a better system than by hot-water pipes, and they should be placed near the ceiling.

18. *On Ventilation.*

The necessity of ventilating sick wards is now generally admitted, and yet the reasons why we should pay special attention to the subject cannot be too often repeated. Every one connected with hospitals, including nurses and attendants, should bear in mind that man poisons the air by his own exhalations. The unpleasantness we experience when we meet and remain with a number of other persons in a room, is only owing in a slight degree to that dangerous vitiation of the air which led in some cases to most calamitous results. Need I say that I allude to the horrible tale, often quoted, of the Black Hole of Calcutta, and to the fearful mortality on board Coolie ships?

It is proved that in such cases air does not contain the necessary proportion of oxygen; that is to say, of the principle of breath and life, but carbonic acid in its stead, and that it is loaded with vapour. As the sick do not only exhale carbonic acid and vapour, but other noxious matters, there is every reason to consider the best means for preventing the vitiation of the air in the wards.

The importance of the subject renders it necessary to describe the various systems of ventilation, in order to arrive at a sound conclusion. Even those who do not approve of them, should be well acquainted with their construction, if only to pay a tribute to the ingenuity of the human mind.

Lately much has been said on natural and artificial ventilation, and people are divided in opinion as to the value of each. But I

believe that it should be the object of those, whose advice might be asked, to find a proper combination of the two systems suiting the special case.

I will mention first some of the most simple means or contrivances for ventilation. They all have for their object either to admit fresh or let out vitiated air; they are intended for inlets or outlets. Arnott's valves are for outlets good in principle, and not without effect in private rooms; but I have found them useless in hospitals (pp. 109, 119, 148), as they soon get rusty, and do not act. Sherringham's ventilator is an inlet placed in the wall, and can be shut at will. Watson invented a square tube, divided down the centre; Mackinnell recommended two tubes, one within the other. Both the latter inventions answer the double purpose of inlets and outlets. Muir's ventilating square tube (principally inlet), has a box with louvres (p. 124) at the top, and is much used for public buildings, churches, offices, town-halls, &c.

In some cases these inventions may be useful; but on the other hand they are unsafe, because, when intended for inlets, they become outlets, and *vice versâ*. It is impossible to take into account all the changes and currents of the atmosphere, and besides, a ward is not a closed room, but has doors and windows, which are sometimes opened. If a door is opened you have a draught to it; and supposing you have an eduction channel, or outlet for vitiated air, you cause by that draught the vitiated air to return into the room. A large fire draws the air inwards in the same manner. It might be answered that valves can prevent any occurrence of the kind, but then I know from my visits to hospitals that valves do not answer the purpose in more than half the number of cases where they are used. They generally become rusty, and even though at first working well, cease to act after a short time. Some of the valves are intended to be moveable by the slightest air-current, weights being introduced for that purpose; but the result is not satisfactory. The ropes and weights are there, but if you pull them they do not act. In fact, I am much disposed to consider slanting openings, without any valves whatever, and communicating with the atmosphere without anything interposed, or air bricks, far more harmless than any other contrivance.

The so-called artificial systems are based on two principles, and therefore belong to one or the other of the two before-mentioned divisions. The principle of those of the first class, is the extraction or suction of impure air from the wards (*systèmes d'aspiration*). In those of the second class air is forced in by mechanical means.

Ad. 1. The system of ventilation-fires is the oldest. It is in use in mines, the Houses of Parliament, and some hospitals (St. Mary's,

Gonzaga's). The heat of the fire causes the air to become lighter, and ascend. The air beyond the direct action of the fire follows to take the place of that portion removed; this being due to the atmospheric pressure. In this way a continued draught is instituted, and as the fire can be placed in such a position that no air but that from the ward moves in the required direction, the wards are emptied of the foul air. In the meantime pure air enters from the outside by openings made for the purpose. Two conditions are essential for the working of the system:—First, that the fire is kept up so that the air in the air-shaft remains at a high temperature; secondly, that as much fresh air enters as is extracted. If the quantity of air which we want to extract is large, the air in the air-shaft must be heated to a high degree to cause a sufficient draught; this can be done by a large fire, the expenses for supporting which are considerable; or the same result may be obtained by having a wide air-shaft, and wide canals of eduction, which are objectionable on architectural grounds.

There has been a controversy about the place where we should have the fire, some recommending the basement, others the higher floors of the building. When it is in the basement the draught is stronger, because the whole height of the air-shaft operates in drawing the air out. The draught is equal to the difference between the heated air of the shaft and an equal column of normal air; the higher the heated-air column the stronger the draught. On the other hand, some of the power of it is lost by the distance of the fire from the wards. If the fire is on the upper floor, this distance is less. The shorter the air-shaft, the more quickly the air gets cool in it. Should the fire flag, the longer it is, the less liable is the air to change its temperature, and cold air blown down the shaft makes less difference.

The least objectionable arrangement would be, if it is required to ventilate by fires, to draw the air of the lower floors to one furnace, and that of the top floors to another.

Where the wards are heated by open fires, it is a good plan to lead the smoke into the air-shaft, by which the temperature in it is raised. It is necessary to have the air-shaft much higher than the highest part of the building, at least ten feet above that part, so that the foul air cannot easily be blown back into the wards. Weather-boards are placed in the air-shaft near its top, and rain-tubes to let off the water.

Another means to promote ventilation is by a hot-water reservoir placed near the roof of the hospital, and to which all the foul-air channels lead from the wards. (*See p. 173.*) The space round the

reservoir or tank is enclosed by a mantle, and all the foul air passes through it. The hot-water makes the air lighter and thinner in the same way as a fire does, and so the draught is caused. This system is more expensive than the first, but it serves for heating at the same time. In the summer it is of so little use that the air channels are shut up. The difficulty is to keep the water of a high temperature, without which the draught is not strong enough; and it is certainly some time before the water is sufficiently heated.

Ad. II. The mechanical ventilator is used to propel or force air into the wards. If set in motion by the hand or by the wind, it is of no effect whatever; it can only be properly moved by steam power. I do not know if water power has been tried.

The fans in use at present have two, four, or six plates, which are attached to a central axis, and they may be either straight or bent to an angle. The axis rotates with great speed, which can be accelerated or diminished, and the engineer should be thoroughly acquainted with the objects in view.

In winter time, the air which is forced into the wards must be warmed, and so we generally find some means by which this is effected. In one hospital (London Fever Hospital) cold air is injected. In some instances the air is warmed at a distance from the wards, in others it is warmed in them. Recently it has been recommended to pass it through an apparatus just outside the wards (Vorwaermer); or it might pass through a stove in the ward. It has been found more difficult to ventilate satisfactorily with warm air than was at first expected. As the system Farcot-Laurens is expensive, Van Heeke's was introduced in two Paris hospitals (p. 168). I consider it unhealthy; the air is too dry, although it passes over a water surface, and smells close.

On Natural Ventilation in Hospitals.

The term "natural ventilation" is of recent origin, and implies that no artificial means as described above are used. We rely for this kind of ventilation on chimney-fires in winter time, and on doors and windows; but, in so far as their construction is—if not artificial—yet in some way scientific, and requires a certain ingenuity, the term natural is not quite logical. I use the term as it is generally understood. A means of natural ventilation which is rarely alluded to is that by the brick walls. The amount of air which enters a hospital ward through a brick wall, supposing it not to be impervious, is considerable. Pettenkofer has been able to blow out a burning candle through a brick wall; and there is no doubt that the change of the outer temperature in a room, the windows and doors of which are closed, is partly owing to the per-

meability of the building material. Lastly, air enters through the chinks of doors and windows unless they are pasted over; and that the quantity of air is considerable, may be easily perceived by placing the hand or face against the chinks. It is not at all certain that the patients are benefited by making walls, doors, and windows impervious to air. But as regards the walls, we do so in order to keep them free from impregnation with organic matter.

As for doors, we either find moveable glass-panes at the upper, or square apertures at the lower part,* or brattices or louvres in them, or the two latter in the wall above them. Large louvres, say five feet by three, over the entrance door, are valuable aids to ventilation when the air in the hall or staircase is sweet; and they might be kept more or less open continually, even during the night.

As regards the windows,† I mentioned already that the French *croisées* are inferior to sash-windows (p. 17). There is one sort of *croisées* where the “*battants*” can be kept fixed in any desired position by means of rods; but I found them very rarely used. Sometimes you find one pane of the window (generally an upper one) revolving or opening inwards, or the whole upper part, say one-sixth of the window, opening on an incline inwards, the lower part being *croisées*. I need scarcely mention the circular ventilators which are placed in an upper window-pane (*Windräder*); they are not much used now.

The sash-window is suspended by weights in such a manner that it slides in a vertical direction, and keeps its place in whatever position you leave it. You can therefore cause an air-current, weak or strong, just as you please, by leaving it more or less open; whereas the common *croisée* window when opened, lets the air rush in in a larger quantity than is desirable. The sash window can be combined with a pane at the top or bottom, revolving inwards. Louvres can be placed in windows in the same way as in doors. To keep windows which open inwards in a desired position, ropes are used or levers and toothed wheels.

Windows can have three or four compartments, and these may represent the above-mentioned construction in different combinations. Sometimes all the compartments revolve inwards; sometimes the two upper ones. Windows can be of thick plate-glass, or double, and the latter have narrow or wide spaces between them. This space can be used to let the air enter and reduce the celerity of its current.‡ Windows may be coloured, made semi-transparent, perforated (punched), or be composed of small brattices. The two latter

* Zürich Hospital; Hanover Military Hospital.

† For windows in Lunatic Asylums, see under that head.

‡ St. Mary's Hospital.

kinds are more suitable for offices than hospitals. Perforated zinc-plates, the whole width of the window and five or six inches high, are capital means for ventilation; they are generally placed at the top of the window, and where there is a sash they are in front of it, so that they let the air in when the window is partly lowered. The current of air is diminished, and yet a considerable quantity admitted.

It is, however, not always desirable that we should be obliged to lower the sash, because the air enters between the upper and lower compartments of the window as well as through the open space at the top. Therefore the zinc-plates might be inside the window-frame, and yet separate from the upper sash, and they might be double, one sliding over the apertures of the other.

To prevent patients shutting a window, I suggest a simple contrivance. Let a piece of wood, about three inches long, be fastened by a hinge to the frame, so that it drops when the sash is lowered; the nurse having a long rod with a hook at the end to raise it when she shuts the window. The frame to have a groove, serving as a receptacle for this piece of wood.

If it is desired to let air enter between two sashes, and nowhere else, we raise the lower one and place a board on the lower border to close the open space. It is easy to make the windows of the waterclosets self-acting, so that they open when you leave and shut when you enter.

Open chimney fires are considered useful as a means of natural ventilation on account of the strong current of air caused by the fire. A large fire causes heated air to ascend to the ceiling; it gradually spreads to the opposite side of the room, or nearly so, then descends and returns near the floor in the direction of the chimney. This has been demonstrated by experiments, numerous scraps of paper being suspended in the air from the ceiling of a room, to show the direction of the current. Where more than one chimney is required, they must be at some distance from each other, so that they do not draw one upon the other,* and the fires must be about equal in size and power. If the chimneys are surrounded with air chambers they are even more useful, especially in cold weather.

The remodelled fire-grates are quite as efficient for ventilation as chimneys, if not more so.

Testing the System of Ventilation.

Besides the senses, which supply a test always ready, there are some other means for ascertaining the sufficiency of ventilation.

To test the quantity of air admitted into or extracted from a ward,

* St. Mary's Hospital.

we have the anemometer, a little instrument which has four sails or wings. These wings are easily moved by the draught, and from the number of turns in a minute we ascertain the quantity of air that has passed the anemometer.

To test the quality, we have to analyse the air to see how much carbonic acid and water it contains. For the first purpose Pettenkofer's test is the best.* The air is shaken with lime-water of known strength (generally 1.1 to 1.3 grm. of lime to a litre), and the quantity of lime remaining in solution is found by testing with acid. Pettenkofer recommends a solution which contains at 64 degrees Fahrenheit 2.250 grm. of crystallized oxalic acid in a litre: 1 cc. saturates 0.001 grm. of lime. The point of neutralization you find by turmeric paper, on which you let fall a drop of the fluid; the peripheric portion of the drop turns to a brownish colour, if only a small portion of the lime is left in solution. For if only a drop of lime-water is mixed with 12.15 cc. water, the fluid, treated in the stated manner, shows basic reaction, although by immersing the turmeric paper it cannot be seen.

To make the experiment, take a glass bottle with well-fitting stopper, and containing about 6 litres of the air of the locality in question. Add 45 cc. of lime-water, and shake the bottle repeatedly in the course of half an hour, so that the carbonic acid becomes absorbed. The turbid lime-water is poured into a small glass to settle. Then take 30 cc. of the clear fluid to test with oxalic acid. From the quantity of the acid multiplied with 1.5 (as you took of the original 45 cc. only 30), you find the free lime, which has not combined with the carbonic acid, and by the difference the lime bound to the carbonic acid; by this the weight of the carbonic acid; and then easily the volumes, as 1000 cc. at 32 deg. Fahr. and 760 mm. B.P. are equal to 1.9677 grm. If the air contains ten times as much carbonic acid as is found in atmospheric air, we have to take 12.15 cc. or more of lime-water to a litre.

We test the hygroscopic quality of the air by the hygrometer; that of Saussure is generally used. It consists in a hair drawn through a frame. The hair is acted upon by the moisture, and moves a hand on a dial as it becomes longer or shorter.

For an exact investigation, we must know for each degree of the hygrometer what would be the weight of the water contained in a space equal to that of a centimetre of air at 66 deg. Fahr.

Another way to find out the quantity of water is by letting the air which we examine pass through pumice stone, which absorbs the water, and weigh it before the experiment and after.

* Fehling, in Liebig's "Handwörterbuch."

Lastly, we may test the hygrometric condition of the air by dry and wet bulbs.

Organic matters suspended in the air of hospital wards may be determined by a solution of permanganate of potash. The test is valuable, although it indicates only the oxidizable part of the organic matter.

On Cubic Space of Sick Wards, and the amount of Fresh Air desirable to be supplied by Ventilation to each Inmate.

Before we decide on any plan of ventilation, we should know the amount of cubic space it is intended to allow the patients. We find the space small in overcrowded wards, and the best ventilation would not prevent some of the evil consequences thereof. The lowest possible estimate of space in which a healthy man could live for twenty-four hours, with no other means of ventilation than the accessory ones—viz., the chinks of the doors and windows, is 30 cub. met. (about 1050 feet). If it is less, the air becomes unfit for respiration. As regards sick people no experiments have been made, but there is no doubt that they require more space than healthy ones.

In existing hospitals, the cubic space varies from 600 to 2500 feet; but no recent establishment of any pretence affords less than 1200, which amount, in the opinion of many surgeons and hospital physicians, is sufficient under ordinary circumstances.

Fever patients, clinical cases, women in childbirth, and persons who have been operated upon, are considered to require a larger amount of cubic space than others; and for syphilitic or eye patients, for aged people, or children, a less space is sufficient.

Those establishments which allow ample cubic space, afford undoubtedly better conditions for recovery than others; but there must be certain limits to the space allotted to a single patient, on account of the expenses accruing to the hospital.

The surface area a patient should have, can be more easily determined than the cubic space. As the large wards of a hospital are generally 28 or 30 feet wide, and as a bed must have a clear space of at least three feet on both sides, or six feet across, it follows that the surface space must be $6 \times 14 (= 84)$ square feet as a minimum.

As regards the amount of air to be supplied by a good ventilation, medical men are often requested by architects to express their opinion on the subject, but there is much uncertainty about the point, notwithstanding the most careful investigations.

We may first try to solve the question by scientific deductions.

In the first instance, we must know the composition of pure air. It is, after Schödlér:—

20·815 oxygen.

79·185 nitrogen.

0·0006 carbonic acid.

Poumet does not consider air impure which contains from ·0002 to ·0003 of carbonic acid. As for hygrometric properties, the air ought to contain, after D'Arcet, one-half vapour at 66 deg. of temperature, this being 7 grm. of water in a cub. met. Some philosophers have stated it to be 6·43 grm. The ammonia, sulphuretted hydrogen, and other substances present in small quantities in the air we leave out of the question.

We cannot call the air pure when it has lost its normal proportions of carbonic acid and watery vapour. It is now our object to find out from the increase of carbonic acid in a room where a number of people are collected, how much air is to be provided by ventilation to make up for this vitiation, and restore the air to its normal condition.

Deduction from the Proportion of Carbonic Acid.

Carbonic acid is exhaled from the lungs and the skin of a living being. A man in good health is said by Pappenheim to exhale as the greatest quantum in an hour 50 grm., equal to about 25 litres ($5\frac{1}{2}$ gallons), at 32 deg. Fahr., and 760 mm. atmospheric pressure; Andral, Gavarret, Valentin, Brunner, state about 21 litres; Scharling, 18·5.

Supposing now 20 litres to be right, we have 480 litres of carbonic acid in 24 hours at 32 deg.; when the person is in a temperature of 66 deg. they expand to 510 litres.

But not all the oxygen of the air is used by the process of respiration; only a part of it disappears, and is replaced by nearly the same quantity of carbonic acid; the exhaled air contains 4 per cent. of carbonic acid, or, after Vierordt, 4·33 (*Physiologie des Athmens*). So that 510 litres of carbonic acid exhaled by an adult must be diffused through a quantum of 12·750 litres of air which only contain 4 per cent. of carbonic acid. This would be the quantum supposing we did not re-inhale the exhaled air.

As this is unavoidable, we have to add a new quantity of air in order to restore the normal proportion—that is to say, of ·0002 or ·0003 of carbonic acid.

If the new air were free from carbonic acid, we should have the right proportion by increasing 12·750 litres to 255·000; but as the new air contains from 4 to 5 ten-thousandths, the 255·000 contain 25 ten-thousandths, which, however, is satisfactory.

To satisfy the wants of respiration, we have to supply to an adult 255 c. m. of air in 24 hours, or 10 c. m. 625 litres per hour.

Deduction from the Proportion of Watery Vapour.

Many philosophers have made researches on the quantity of water lost by the body during a certain time, say an hour.

Barral compared the water contained in solid and liquid food consumed, with the solid and fluid secretions, and found by the difference the loss through lungs and skin. A man, twenty-nine years of age, consumed in eating and drinking, 1998 grm. of water, and exhaled 1177 grm. by alvine excretion and urine; therefore 821 grm. were lost by exhalation from lungs and skin. In January the same consumed 1842 grm., and gave off in the same way as above 1032; difference, 870 grm.

The medium was 875 grm., to which, after Barral, the water has to be added, which is formed by the hydrogen of the solid food combining with the oxygen of the stomach or air. This, however, we cannot take into consideration.

Sanctorius, Dodart, Rye, F. Home, Robertson, Lining, W. Stark, and others, tried to find out the loss of water by direct experiments.

I have to refer to the experiments of Séguin, continued during eleven months,* which he made on himself and others. He placed himself in a bag for three or four hours in such a way that only his mouth was left uncovered; he was weighed before and after the experiment, and at different times, and so found the loss from the skin; the exhalation from the lungs was considered to be half that of the skin; and the whole found to be about 1000 gr. per hour. Dumas did not differ much from him.

Valentin† considers the loss from the lungs and from the skin to be in another relation, viz., 5 to 9, and both altogether higher than Séguin (1400). Donders‡ says that the total amount exhaled from the lungs and skin during 24 hours may be estimated at 1 kilog. of water, and of this $\frac{7}{10}$ are exhaled from the skin, and $\frac{3}{10}$ from the lungs.

Considering that the temperature of the examined persons and the humidity of the atmosphere may have varied to a great extent in the different experiments, the results obtained are not so very discordant.

We may with some reason assume the hygrometric loss of an adult as 1000 grs.

Now with Pécelet we assume that one c. m. of air which is half saturated with water, contains at a temperature of 32 degs. 7 grs.

* Mémoire de l'Académie, 1790; et Ann. de Chimie, t. 90.

† Allg. Physiologie.

‡ Spec. Physiol., 1856, p. 433.

of water, therefore about 140 c. m. would be necessary to absorb 1000 gr.; hence we have to provide 6 c. m. of air per bed per hour.

We therefore have deduced the necessity of supplying 11 c. m. to neutralize the vitiation of air by carbonic acid, and 6 c. m. to neutralize the vitiation caused by exhalation of watery vapour. But as the newly-supplied air is only half saturated with water, it might absorb some humidity exhaled by the patients without becoming unhealthy.

It is, however, not to be overlooked that our premises may be wrong. We have considered an air healthy with 2 or 3 thousandths of carbonic acid. Others only concede 1 thousandth (Pettenkofer, Guérin), and many disagree with Péclet, stating the humidity to be less than 7 grs.

But a system of ventilation supplying 17 or 20 c. m. per hour, if satisfactory for healthy people, would not be so for the sick, because they* vitiate the air by many other exhalations. Although we do not know much about the nature of miasmata, we are entitled to believe that they can be removed by air currents.

Taking into consideration all the impurities caused from spittoons, bedding, poultices, infusions, bathing, etc., Poumet thinks the sick require about double the quantity of air that would be considered necessary for healthy people; this would be 30 or 40 c. m. per bed per hour. But 40 c. m. will be insufficient when patients suffer from gangrene or typhoid fever, especially when the temperature is high. A much larger supply is then desirable, the amount of which I scarcely can state in figures.

The uncertainty on the point is considerable. It has been found in Lariboisière that 60 cubic metres (2100 feet) per patient per hour were generally necessary to keep the air sweet (on the male side), and Pettenkofer is not disposed to consider this quantity excessive.

Remarks on the Different Systems of Ventilation.

No artificial system can replace natural ventilation. The quantity of pure air which we admit through open doors and windows far exceeds any quantity obtainable by artificial means. This has been found by anemometric experiments from the celerity with which the air moves through windows. But care should be taken in sick wards that the openings are not so numerous as to expose the patients to draughts (*see* pp. 100, 110), or to reduce the atmosphere of the wards to a low temperature. Nurses should be properly enlightened on this point.

There are circumstances under which artificial ventilation cannot

* *See* Stromeyer, Ventilation bei Typhuskranken.

be dispensed with. In rainy or very cold weather windows and doors are kept shut, especially those of clinical wards, in consumption hospitals, &c. The openings for the admission of fresh air are not sufficient, and in winter time it is desirable to admit warm air, and cool air in summer time.

It becomes, therefore, our business to combine judiciously natural and artificial ventilation. In hospitals built on the pavilion plan it is possible to make different arrangements for clinical and other wards. If we have only to supply fresh air without causing draughts to 50 or 60 patients confined in two wards on one side of the building, this is much less difficult than to plan a uniform system for 200 or 300. I suppose the ward I have to ventilate contains 28 patients, and that it is provided with two patent stoves in the centre, and six openings on each side which contain perforated zinc plates, half the number of which may be kept open in cold weather; in addition there is a trap-door in the ceiling, which is opened for short periods. I should then wish to have also the means of forcing in fresh air—cool in summer, warmed in winter,—by passing through the water stoves outside the ward and the stoves in the centre. There is no other means for doing this than a fan, and the air from the garden might be used, although purer could be obtained at a greater distance. It is possible to force in at least 2000 cubic feet of air per bed per hour, that is 120,000 cubic feet in two hours. The time when fresh air is most wanted is in the early morning and late at night, therefore during this time the fan ought to operate. As explained in another place, there is no danger from compression of the air of the ward, and there can be none from the dryness of it. Besides some of the zinc plates admit fresh air, which the air forced in does not prevent.

I venture to embody my views on ventilation in these few sentences.

1. Ventilation by doors and windows cannot at any time be dispensed with in hospitals.

2. Hospitals may rely on ventilation by windows and doors in summer time, but if an artificial system is to be instituted, none but that by forcing in the air is efficient in summer.

3. In winter time some of the artificial systems may operate with advantage, and cannot be dispensed with in clinical wards or consumption or fever hospitals during the cold season.

4. No channels for withdrawing air should be formed, unless a continuous draught is caused in them by heat. A ventilating fire is a more powerful agent for this than a hot cistern, and for the lower floors it is better to have the fire in the basement. If there

is a second or third floor the fire should be as near them as possible, and not in the basement.

5. Where hot-water pipes or stoves are used for warming, the outer air may pass over or through them into the wards by channels communicating with the atmosphere; where there are only chimneys, they may be surrounded by an air chamber to the same purpose. Such an arrangement is indispensable with the new improved fire-grates.

6. Open chimney fires are capital aids to ventilation, and can be combined with every other system.

7. The construction of the windows is most important, and should be considered well whenever a new hospital is erected. It is not necessary that they should be on a uniform plan. No large entrance door should be without a large louver above.

8. Waterclosets may be sufficiently ventilated by self-acting windows; if outlet channels are instituted, they should lead into the smoke shaft.

9. I suggest that two zinc plates or tablets be placed in the upper part of or above some of the windows, in order to break the air current, the inner plate sliding over the other, so that the apertures may be closed. The nurse to keep a rod for this purpose.

19. *Wash-house—Laundry.*

In most hospitals the washing is "done at home"—viz., in a house connected with the building. In London, however, many hospitals are without a laundry—viz., London, King's College, Bartholomew's, Westminster, and the Consumption hospitals: on the other hand, very large laundries are found in connexion with workhouses; for instance, the City of London. The proceedings in this country and on the continent are different, but the difference between England and France is not only, as Miss Nightingale states, that the French use large tubs for filtering hot ley through the linen, whereas the English boil it by steam; but what the English do first the French do last, and *vice versa*. A description of some apparatuses will be found in the descriptive part. In France, Germany, Belgium, and on the continent in general, the dirty linen is first put in cold water, and rinsed when taken out, by which the matters soluble in water come out of it; it is next put into steam boilers (*see* Berlin Charité), which contain a certain amount of hot ley (to 100 parts of water about four parts of soda), or, hot ley is filtered through the linen by machinery (*see* hosp. "Lariboisière"). After this comes the washing in soap and water, generally by hand, and the proceeding is finished by rinsing (often by machinery or hydraulic press) and drying. In

England they *begin* with the washing in soap and water;* then they rinse the linen, put it in the steam boiler with soda for a considerably longer time than they do in Germany, and afterwards rinse and dry.

As far as I can judge, the continental process is preferable, because the linen gets whiter, and the cost is less. In this country in general the price for washing is about 25 per cent. higher than in France. That the continental proceeding may be suitable for the continent only, and the English for England alone, on account of the difference in the hardness of the water in each country, as Miss Nightingale suggests, I beg to doubt. First, the difference is not so great as has been stated; secondly, it can be removed by artificial softening processes.† But the principal reason is, that the continental process is more in harmony with scientific rules. The most important part of the proceeding is the washing by hand, for which the linen is gradually prepared: what can be done by water alone is done first; what steam and hot ley can do follows; and then there is little left for the most expensive part of the business, that of the hands. To dispense altogether with hand-work has not been found advisable.

I hardly think that even in very small hospitals washing should be done without steam: where this cannot be had, it is better put out. The advantages of using steam, compared with the mode of washing in households, consists in saving coals or wood, soap, hands, because the hand-work is reduced to a third; and time, because the whole is done three or four times quicker. Lastly, stronger solutions of potash are unnecessary, and soda ley is less injurious to linen. Some compounds, for instance, of turpentine, soap, and muriate of ammonia, are recommended for use, instead of ley; and they are very useful, but unnecessary where steam can be had. A little ammonia is all that is wanted.

The drying is done in the open air, or, on horses moving on rails, by hot air. The air can be heated by hot water or steam-pipes, or German stoves, in the basement beneath the drying-room. The said horses or frames (*tiroirs*) are about four feet high, and have several ledges, generally five; they are frequently made of galvanized

* See Guy's Hospital, Bradford Infirmary, London Fever Hospital.

† The value of soft water can be hardly over-estimated. Organic impurities can be more easily got rid of by filtering. To make the water soft we have to eliminate the lime it contains; this is difficult. The less lime the water contains the less soap gets lost; the fat of the soap combining with the lime.

German housewives carefully collect the rain-water in tubs, which receive all the water from the roofs through rain-gauges.

iron. The architect must take care that the vapour is properly educted.

The neat packing of the clean linen in separate airy rooms, and in well-aired and numbered frameworks, as accomplished by the sisters in French hospitals, I am not the first to approve of, and recommend for imitation.

The things used by patients with contagious diseases have to be washed and boiled separately, in separate tubs, and at a higher temperature than the others, additional care being taken that the officials avoid infection.

20. *Disinfection.*

Whatever linen or wearing apparel is suspected of being infected with contagious matters, must be disinfected. Anything worn by patients with cutaneous diseases—as itch, small-pox, or cholera, typhus, &c., belongs to this class. There are two principal means of disinfection—viz., a very high temperature and sulphurous vapours. The former is more expensive than the latter, which requires a very simple proceeding. I saw the former process in use when I visited some London prisons, and in different German hospitals; the second is used much in Paris. A temperature of 194 degrees Fahr. obtained by steam vapour destroys every kind of organic or inorganic contagion. The apparatus is generally kept in the cellar.

21. *Kitchen.*

The kitchen is an important, but much neglected, part of a general hospital. The arrangement of a large hotel kitchen does not form a bad model for imitation. Although patients do not require refined fare, but merely wholesome food, yet few of the improved means for cooking or varying the diet should be absent. Those patients who suffer from indigestion want light, digestible, and specially prepared dishes.

Cooking by steam is a most economical proceeding, and steamers should always be used for vegetables and soup-meat.

Roasting requires to be done before the fire. Gas-stoves are expensive, and cannot be much recommended. Stoves for cooking made dishes on charcoal fires are required for the officials. The continental system is to have ranges of brick with holes, covered with concentric rings of iron (*Kochloch*). Brick holds the heat better than iron. To have a large range in the centre of the kitchen is much better than to have fires at the side; there is more space for cooking, and the steam is less troublesome. Descending flues seem to answer exceedingly well. Chops and steaks especially should be cooked on grates with a downward

draught: this prevents their becoming smoky or blackened (*see* p. 135). Where a kitchen chimney is found, it should be properly constructed; I am informed that the best plan is to have the shaft surrounded by a mantle, there being a capital draught in the intermediate space, always supposing that fresh air enters plentifully from the other side.

As regards the steamers, they may be ranged round the wall, or close to it. I always found the covers suspended by ropes, with balance weights (invisible).

The scullery should be close to the kitchen, and well lighted. Both must be of a convenient height and size.

22. *The Dispensary.*

It should be situated in the administrative block, not too close to the wards: especially that part which contains the laboratory. Offensive smells must not find their way into the wards, and the noise caused by the use of the mortar must not disturb the patients.

The dispensing room should not be in a dark place, but have large windows through which plenty of light falls into it; nor should it be damp. Cleanliness and quick dispensing are promoted by ample light, and a plentiful supply of hot and cold water. Rain-water and condensed steam are of much use in the dispensary (*see* p. 135), and steam or gas is useful for decoctions. A somewhat novel but simple contrivance for obtaining water in small quantities, and without using a tap, is this:—A tube is suspended from a stone jar placed at some height from the floor, and a burette at the further end. The dispensing table should be in the centre, and covered with metal (as in public-houses), the floor of tiles, the lavatory with tilt-basin, as explained in another place (p. 21); and the sink should be large and deep in a corner. Poisonous drugs stand, of course, in a separate place, and are in bottles or jars of a peculiar shape. The cod-liver oil should be in an enamelled slate tank, where a great quantity is used, or in stone barrels with brass cocks, where a smaller supply is required. The dispensing windows should project a little into the waiting lobby; have sliding shutters (better downwards than upwards) of about two feet square, and a rail in front; so that only one person can stand before the window. The drug stores may be partly kept in a cellar, to which access is obtained by a ladder, partly in an adjoining room.

23. *Libraries.*

We find two kinds of libraries in the hospitals, one for the medical officers and pupils, the others for the patients.

Wherever schools of medicine are in connexion with the institutions libraries are also found, at least in this country. They are usually within an easy distance of the museum, and much frequented by the students, therefore undoubtedly useful.

Libraries for the patients are rare on the continent as well as here. They are a great boon to them, and might be easily instituted where they do not exist. As one of the medical officers superintends the medical collection of books, so one of the officials should take charge of the common library. In English institutions the chaplain is the proper person for this office. There is not much trouble connected with it, as the patients interchange the books between themselves. But once a week all the books might be returned. A separate fund could be easily raised for the purpose, and the current expenses are insignificant.

24. *Ice-pit.*

The want of ice is most felt during very hot weather, and when it can only be kept underground. The pit should be formed in a spot as dry and shady as possible. The air must be secluded from it; and in order to prevent it entering when the entrance door is opened, it should be constructed with double doors and a lobby between; the inner door not to be opened until the outer one is closed.

The shape of the pit should be conical, the smaller part of the cone at the bottom; the top may have a diameter of 15 feet, and the depth should be 18 or 20. A smaller pit covered by a grate should be made beneath, to drain the water formed by the melting of the ice.

The walls of the pit should be covered with wood or bricks, and where the earth is very hard, with straw. The roof should be composed of wood, tiles, or straw, or a combination of these substances, the lower margin buried in the earth, or if there is a low wall it should be surrounded by an outer earth wall.

Double walls with clay between them are needed when the ground is damp, and sometimes drains. The entrance should always be from the north.

25. *Dead-house.*

It should be removed from the view of patients and visitors, and have a separate exit, that cannot be seen from the hospital, so that funerals are not noticed. The *post-mortem* rooms must be spacious, especially where a large school is attached to the institution. The rooms and amphitheatre properly arranged as regards light,

drains, lavatory, &c. ; and a private room should be found for the professor.

I would suggest the use of tables covered with galvanized iron.

26. *Tramways.*

These are found in some hospitals in the *souterrain* (*Rudolphstiftung, Kiel*). They serve to convey food or other things placed on small carriages. They are also used for carrying hot-water dishes, cloth, medicine, or the patients themselves.

I may mention in this place the tramways on the tables of the microscopical rooms of one hospital (Berlin). The microscopes are moved on wheels without being disturbed.

27. *On improving existing Hospitals.*

It is possible in a hospital which contains too great a number of small or double wards to throw several into one by removing partition walls (*see* p. 142); it is also possible in corridor hospitals, where windows are on one side only, to improve ventilation by judiciously placing apertures opposite the windows. (*See* p. 114.)

Where the number of baths is insufficient, it can be increased. Bath-rooms which contain no means for warming may have a small Gurney's stove placed in them, the window if not double can be made double; should the room have no window, a slanting aperture can be managed near the ceiling (as an outlet for the steam).

Common bath-rooms can easily be attached to a hospital in a separate shed; they must contain vapour-bath and douche, and be placed near the engine house. Enamelled earthenware baths should be preferred.

Lavatories where they are not found can be instituted, and those with tilt-up basins should be preferred (*see* Lavatories). A defective sink can be replaced by an improved one.

Waterclosets when badly placed should be removed, and new ones built out of the main building at a convenient place. It is sometimes possible to institute the means for warming them described at another place.

Perforated zinc plates can be placed in front of upper sash windows.

Low kitchens can be improved by carrying the ceiling higher or the floor lower, but where both cannot be done and a new kitchen cannot be built, it is still possible to obviate the principal nuisance of steam and smoke by placing a range with descending flues in the centre, the fire-place to be blocked.

A dark dispensary should be transferred to a well-lighted room.

Gas burners ought to be connected with ventilating tubes, as in the Herbert hospital and new Leeds Infirmary.

Hospital patients should wear a dress provided by the hospital. A woollen stuff is the best material.

Patients' libraries can be instituted, and should be under the care of the clergyman.

I should think that it will be in many instances possible to institute foul-linen shoots where they do not exist, as lifts have been frequently added where they were not found before.

The out-patients' department might be improved in some hospitals. As regards the waiting-rooms, males and females should not sit together; a simple iron rail might divide the room into two compartments. There should be separate doors for ingress and egress of patients.

Day and dining rooms might be added where they do not exist.

Hospital carriages should be provided—especially for fever cases.

28. *List of some of the Useful Implements, Improved Utensils and Machines which might be provided for the Hospital.*

Hall, Garden.

Hexagonal hall lantern, with stained glass; cast-iron bronzed umbrella stand; patent chair (*à balance*) to carry patients up the stairs; speaking tubes, or telegraph; garden engines (Burton's, 39, Oxford Street).

Wards.

Bed-pans and urinals of earthenware (Coxeter); water-beds; machines for a reclining (half-sitting) position; bed-warmers, bed-trays; locker-tables; atomizer for disinfecting fluid (Condy's). The cheapest are two brass, or, better, glass tubes, placed in a rectangle; if one is placed in the mouth and blown into, the other communicating with the fluid, a fine spray is caused. The tubes can be separate or moveable on each other. Barometer, thermometer, anemometer (Casella), manometer.

Wire flower-stands for convalescent room.

Baths.

Enamelled earthenware (Rufford, Stourbridge pottery); suspending shower-bath, oval nursery basin, on three-legged table, with castors and loose frame; vaginal douche; galvanized cast-iron box fixed close to the ceiling, with india-rubber tube, having an ivory end-piece.

Improved portable hot-air and vapour bath, author's (Krohne and Seseman).

Kitchen.

Bainmarie, with copper pans; travellers, with hot-water dish, fixed hot-plate; hot-water dishes for meat, with cavity for the gravy; wooden meat-screen, lined with tin; wrought-iron dripping-pan and stand; tin boxes for the lifts; white enamelled plate-slabs for meat stores; ditto tanks for milk; fly-proof meat safes; knife-cleaner.

Laundry.

For large hospitals, Bouillon's apparatus for "arrosage" (see Lari-boisière); for small ones, Bradford's patent machines (mangling is better done by a separate machine); travellers for wet cloths.

Carriages, Stables.

Large hospitals should have a carriage and horses for the director or treasurer, patients' carriage, and fever carriage. The latter conveyances should be long enough to place the patient in a horizontal position on an air-tight mattress, which is slipped in and out on a frame. The carriage should be well ventilated by opposite lattices and small louvres in the central portion.

II.—ON THE ADMINISTRATION OF HOSPITALS AND CHARITABLE INSTITUTIONS.

1. *On Centralization and Self-Government.*

However convinced one may be that a system of centralization as it exists in Paris* for the relief of the sick poor has great advantages, it does not necessarily follow that this system should be introduced everywhere. It is, however, desirable that people in this country should not object to become thoroughly acquainted with the usages of other countries, in order to appropriate as much of that which is useful as they possibly can. Many English ways of managing certain matters might be introduced with advantage on

* L'Administration Générale de l'Assistance Publique is a board appointed by Government. At the head is a director. All the hospitals, hospices, lunatic asylums, institutions for medical and other relief, convalescent institutions, &c., are under this board. A bureau central is in the centre of Paris. Patients who wish to be admitted into a hospital apply for a ticket, and are sent to an institution where there are vacant beds. Only a few hospitals at a distance from this office are allowed to dispense with this formality. But every applicant is admitted.

the continent, and a certain competition to be the most perfect in these affairs can only have beneficial results.

I have not to deal here with pauperism; but I consider a good system of medical relief for the sick poor an important agent to prevent the spread of pauperism. That much in this direction has to be done in this metropolis no one denies at the present time, when the existing system of medical relief is undergoing a complete change. What may be done under existing circumstances, the following observations, I hope, will explain in some degree to the reader.

I begin with the hospitals. In Paris they are all Government institutions, whereas in London they are private and (three excepted) not supported by Government, but by voluntary contributions. They may be well constructed and managed in both places; but there is one great difference resulting from the English mode which cannot be passed over in silence. The subscribers to private institutions expect certain rights and equivalents, especially that of recommending patients for admittance. Now this excludes general admission as a rule, however frequent the exceptions may be. Therefore the persons for whom we erect the hospitals—viz., the sick poor, are deprived of their legitimate rights. Those who most require admission are not the class known to governors. To be afflicted with sickness, should be the only valid and sufficient reason on which a poor person is entitled to admission. If the patients are admitted by letter, those often become inmates of the hospital who are much better out of it, and those are not admitted who live in wretched lodgings. In the country, you often find the hospitals filled with trivial cases, especially in the first half of the year, when the governors are well provided with letters; the poor, who suffer from the most acute and serious diseases, are treated at their homes, where the conditions for recovery may be marred by want of the necessary cubic space, nursing, and proper food. Even in London delay and difficulties arise when a sick and poor person wants to be admitted, as letters are only given out on one day in the week. It might be said, that for those who cannot be received into the general hospitals the workhouse infirmaries are open. The latter, however, are not so perfect in their arrangements as hospitals, and as they serve principally to receive those who fall ill among the persons living in the workhouse, they are also small, containing generally about 100 or 120 beds.

The hospitals in German cities are either Government, municipal, or free institutions. The municipality often avail themselves of institutions with the management of which they have nothing to do; this is simply done by farming beds, and generally less than

2s. 6d. per day per head is paid. Although this is also done in London (for instance, the Jewish board of guardians farm wards in the London Hospital, and the Unions farm beds in the Small-pox Hospital), yet it is very rare. In Scotland and Ireland it occurs more frequently, and may be suggested to boards of guardians as a good means to prevent overcrowding of workhouse infirmaries.

All this, however, is superfluous under a system of centralization (as in Paris), where means are soon found to satisfy the wants of the sick and needy; for instance, should an epidemic, like cholera, break out, buildings are quickly transformed into temporary hospitals.*

It further must strike every one, that centralization works more cheaply than self-government; only to mention a few points:—A great deal of money is wasted in advertising and public dinners, without which the institutions cannot get subscribers. But this might be said to be somewhat counterbalanced by the gratuitous services of managers and medical officers.

It is better for special hospitals to be free institutions, with the exception of lock hospitals. The latter are almost as necessary in certain localities (scafarine towns) as military ones for soldiers. Female lock hospitals should be founded and supported by Government. A great deal of misery to mankind might be prevented by such institutions being founded by the State in places where they do not as yet exist.

As regards dispensaries, those which are free institutions are of a different character from those that are under Government control; the committees of the first should strive to keep them in a state of the greatest possible perfection. There should be a staff of able medical officers, and the visiting of the sick poor should receive especial attention. Quick and trustworthy dispensers should be engaged, &c. Some of these dispensaries are very useful, by attending midwifery cases.

It may be said of both hospitals and dispensaries, managed and supported as they generally are in this metropolis, that besides the blessings they confer on the sick poor; they promote good feeling and harmony between different classes of society.

2. *Who should be at the head of a Hospital?*

The existing institutions are governed and administered in different ways. The supreme authority may rest with one director or two, or with a number of gentlemen who form a committee. Now if there is one man at the head, it seems very natural that he should be a medical man. We may reasonably suppose that he knows better how to satisfy the wants of patients than one who has not been in con-

* See also St. Petersburg temporary dispensaries.

stant intercourse with them. Other medical men are more likely to submit to his authority than to that of one standing outside the profession. Knowing from his own experience as a resident medical officer or *interne* the minor details of management, he would be the right person to watch and superintend the subordinate officers. On the other hand it is contended that medical men in general are bad business or administrative men; and that others, therefore, should be preferred who possess this qualification in a greater degree. That two directors should exist (as in the Berlin Charité), is rather an exceptional state of things owing to peculiar circumstances. In some German hospitals and in many French provincial and Irish charities a head sister reigns supreme; in Italy a monk belonging to the order that founded the establishment sometimes acts as director. In England, as a rule, the management is in the hands of a committee, and this arrangement has some advantages. They transact business in a proper manner, usually follow the advice of their medical officers, who have been elected by them, afford means of social intercourse, and give an opportunity to the members to manage important affairs.

3. *Hospitals as a means for Medical Education.*

On the continent the hospitals are to a great extent looked upon as a means for medical instruction without detriment to the patients, and the number of *internes* or resident officers is comparatively much greater* than in England. It is only lately that in this country a medical man is not considered to be in possession of satisfactory scientific attainments unless he has acquired his knowledge in a similar manner. But the majority, at present, are still satisfied with the opportunity of learning the art and science of medicine afforded by assistantship to a practitioner. The hospital authorities will find it necessary to accommodate themselves to the changed system of education, and afford an opportunity to a greater number of improving their knowledge by residing in the establishment. A short residence in a hospital at the commencement of the medical career is of great importance and value; the student becomes an exact observer from the beginning, and many commence the study of a speciality in which they afterwards excel, at this period of their practical education.

The staff of hospital physicians and surgeons should be recruited from late resident medical officers, and they should also have the preference when an appointment is to be filled up in workhouse infirmaries.

* See Lariboisière, Vienna general hospital.

4. *On Written or Printed Rules for the Officials.*

Any one whose duty it becomes to make or assist in making rules for a new establishment respecting the management, duties of honorary or other officers attached to it, &c., will be enabled to do so by studying the numerous reports and written regulations of existing charities. He may not find it without interest to compare the rules of English and continental institutions.

No one connected with a hospital ought to forget that it principally exists for the patients: it is not founded or supported to flatter the vanity of committee-men, to give a director an opportunity for ruling tyrannically over his subordinates, or to set up a medical man in practice. The grand object is charity: to attain it all must work together harmoniously, and the best rules would be useless should common-sense and goodwill be wanting.

5. *Dress of Patients.*

On the continent every hospital inmate, some paying patients excepted, wears the dress of the establishment, not his own; but the English system is to let the patients bring their clothes into the wards, where they have the right to keep them until they leave the institution. They have generally to pay even for their washing. It is a fact that patients sometimes cannot be admitted because their dress is too filthy, and are refused admittance for this reason.* Now this is wrong; but there are other objections to the English system. The boxes in which the clothes must be kept, occupy a considerable cubic space, and are sometimes very large; I have seen them fill the greater part of the space underneath the bed, about 20 cubic feet.† There is no certainty that unclean things do not get into the wards, and sometimes the boxes are unsightly. The other plan does not give rise to any such inconvenience, but it is expensive. It has the advantage, that patients can be recognised by their dress, and are therefore under much better control. It is easy to let the patient change his clothes before he is admitted into the ward. There may be separate chambers for undressing, and the things are kept stacked, numbered, and ticketed. The hospital dress is put on after the patient has had a bath, his own is returned to him when he leaves the hospital convalescent or relieved, or when he is permitted to walk outside the hospital.

* A diabetic patient informed me at the dispensary, that he did not succeed in his application for admittance to a metropolitan general hospital on account of his dress.

† City of London Hospital for Diseases of the Chest.

The dress of hospital patients must be of a suitable material, that will bear washing, and keep them warm. A woollen stuff is the best: the principal article is a gown, almost fit for either sex; the colour need not be quite dark, nor need all patients have dresses of the same colour, but there should not be many different dresses; the under-clothing is of flannel. The whole dress may be provided for less than a pound; of course this system involves other expenses, those of keeping extra servants, supplying more baths, &c.

We need not fear that the patients would object much to the system. Of course they would grumble a little the first time, as they did in the institution where I saw it adopted,* but they soon got used to it.

All those institutions that are endowed or rich enough to introduce the continental plan should not hesitate to do so, and include it among the modern improvements.

6. *On Hospital Statistics.*

Whatever opinion one may have on the value of hospital statistics, I certainly do not think it desirable to take careful notes on unimportant cases. What is the use of knowing the number of cases of scabies, or obstruction of the bowels, of acne or orchitis, and similar diseases during the year, with the sex, age, &c., stated? It is quite another thing to follow up zymotic diseases, lung disorders, or certain grave operations, and compile the materials for comparison between different hospitals and countries. But the rage for statistics must not lead us so far that we inflict on ourselves the disadvantages of bureaucratic institutions. The difficulty is to do enough, and yet not to do too much. Statistics are a recent science, and when cultivated properly may lead to good results.

As there is no central administration for the hospitals of this metropolis, the only way to come to a practical result is by a commission of medical men. They should agree upon a limited number of diseases, which they advise to tabulate in the interest of medical science and sanitary improvements. It would, however, be necessary to tabulate the patients of the workhouse infirmaries and special hospitals as well, and to know the number of incurables. All this should be done as much on the plan of other countries as possible.

7. *On the Diet of Hospital Patients.*

There cannot be much difficulty in making rules for the diet in

* Bradford Eye Hospital.

a newly-built hospital. There are usually four different diets, and much depends upon the custom of the place and country. It is well known that a great difference exists between continental and English cooking. We find by looking at the diet-tables that the supply of meat is somewhat different even in the same country, and in some institutions rather scanty. It is not advisable to replace the meat by weak broth or soups, and it should always be borne in mind how much the progress of recovery depends upon substantial and digestible food. It is true that patients who are not satisfied with their portion ask for extra diet and get it; but the diet should never be on too limited a scale.

The example of liberality given by most of the London hospitals has not been without its due influence on the dietary regulations of continental hospitals, and it would certainly be a retrogressive measure if the diet was restricted here in any way. It is not out of place for a high-standing hospital physician to judge himself if the quality of the food which is supplied to his patients is good by tasting it. Patients do not always like to complain that the milk, beef-tea, bread, or other articles are not good.

I append some diet-tables of this and other countries (on opposite page).

8. *Cleanliness.*

A special mattress-room is very convenient in hospitals, where the mattresses are taken to pieces and made up again. The ticks are washed and remade; the hair should not be put in loosely, but stuffed in properly, and the thread passed across. This takes some time; a woman is nearly two days over it, and therefore it is often neglected; but it is of great importance, and should be done.

It is not advisable to have this done out of the hospital; it is not fair, in the first instance, to subject tradespeople to infection; secondly, it is not economical, because they charge very high for it; and thirdly, a greater part of the material gets lost to the hospital, as I have several times been informed that the mattresses have less weight when sent back, and often an inferior article is substituted for the horse-hair.

It is of importance that all the parts of the hospital should always be in the greatest possible state of cleanliness. Great is the difference between different institutions and different countries in this respect; but it becomes members of the medical profession to have always in mind the welfare of their patients, and therefore to see that nothing is neglected as regards cleanliness. This includes that the patients

DIET TABLES.—ORDINARY DIET FOR MALES. (FROM BRISTOWE AND HOLMES, HUSSON AND ESSE.)

	Meat. * Cooked, † Uncooked.	Bread.	Potatoes.	Tea, Coffee, or Cocoa.	Butter.	Milk.	Gruel, Porridge, &c.	Beer.	Soup or Broth.	Cheese.	Pudding or Vegetables.
Royal Free University College	10 ozs.* 8 ozs. alternate days.	12 ozs. 1 lb.	8 ozs. 8 ozs.	1½ pint —	— —	¾ pint. ¾ pint.	1 pint 1 pint	Extra —	— 1 pint alternate days.	— —	— —
Metropolitan St. Mary's Middlesex	4 ozs.† 6 ozs.*	12 ozs. 12 ozs.	8 ozs. 8 ozs.	2 pints —	¾ oz. —	3 ozs. ¾ pint.	— 1 pint alternately, ad lib.	Extra Extra ¾ pint	1 pint alternately. ¾ pint alternately.	— —	— —
Guy's (Westminster)	4 ozs.† 4 ozs.†	12 ozs. 10 ozs.	8 ozs. 12 ozs.	— —	1 oz. —	— —	— 2 pints	Extra Extra	— ad lib. alternate days.	— —	¾ lb. alternately.
Liverpool Southern	6 ozs. or lobscouse. 6 ozs. alternately.	ad lib. ad lib.	ad lib.	2 pints	— ad lib.	— 1 pint	— 1 pint	Extra Extra	— 1 pint alternately.	— —	— —
Bradford Bristol General Hospital	4 ozs.	12 ozs.	4 ozs.	1½ pint	—	¾ pint	1 pint (or bread and milk).	Extra	—	—	—
" Royal Infirmary. Exeter	6 ozs. 4 ozs.	12 ozs. 14 ozs.	6 ozs. 8 ozs.	Extra	About ¾ oz.	¾ pint Porridge 1 pint. ad lib.	— —	— 1 pint	— 1 pint	— —	— —
English Lincoln	6 ozs. alternately.	ad lib.	ad lib.	2 pints	1½ oz.	— ad lib.	—	Extra	1 pint alternate days.	— 1 oz.	— —
Hereford	4 ozs. alternate days.	1 lb.	ad lib.	1 pint (or broth), tea weekly.	6 ozs. weekly.	ad lib.	1 pint	1 pint	ad lib. alternate days.	1 oz.	—
Gloucester	4 ozs. alternate days.	17 ozs.	6 ozs.	2 ozs. a week. Extra.	—	1 pint alternately.	1 pint alternately.	¾ pint	1 pint alternately.	1 oz.	—
Norwich	6 ozs. alternate days.	14 ozs.	ad lib.	2 pints	¾ or 1½ oz. alternately.	ad lib.	—	1 pint	1 pint alternately.	2 ozs. alternately.	10 ozs. alternate days.
Portsmouth	6 ozs.	14 ozs.	8 ozs.	2 pints	1 oz.	ad lib.	—	Extra	—	—	—
Aberdeen Dundee { Dunfermlie	In soup. 4 ozs. 8 ozs.*	10 ozs. 14 lb. 4 to 6 ozs.	In soup — Some with the smaller quantity of bread.	¾ pint 2 pints —	— — —	1 pint 1½ p.=6 gills	¾ pint 12 gills	Extra —	1 pint 1 pint 1 quart.	— — —	— — —
Scotch											
Irish { Dr. Stevens's { Adelaide	8 ozs. 12 ozs. soup meat, 12 ozs.	1 lb. 13 ozs. 14 ozs.	— 14 ozs.	2 pints 2 pints ¾ pint	— — —	— — ¾ pint, or claret, 3 oz.	— — ¾ pint	— — —	1 pint ¾ to ¾ pint	— —	— 18 ozs. vegetables. 15 ozs.
Paris											
Berlin	18 ozs. rve bread	18 ozs.	12 ozs.	¾ pint	—	—	1½ pint	—	—	—	

themselves are kept clean in their persons, and also that their dress and bed things and the dishes or implements they use are tidy.

9. *On the Payment of Medical Officers.*

Physicians or surgeons attached to continental hospitals or institutions of a similar kind receive a salary for their services, which, however, is generally small (*see* p. 175). The most celebrated medical men in Paris, Berlin, Vienna, and other cities, do not decline to take it, nor do they lose caste by it.

As a rule, these officers are honorary in this country, the colonies, and America; but poor-law medical officers everywhere receive a salary. As regards London, the endowed hospitals and a few dispensaries pay salaries to their physicians and surgeons; where medical schools are connected with the charity, the common fund obtained from the pupils' fees is generally divided between the head physicians and surgeons, but all the other gentlemen derive no pecuniary benefit from, nor is direct patronage connected with, their offices. It is, however, impossible that under the present system the committees of these institutions can find means to pay medical men, and this is the reason why they offer cheerfully their gratuitous services. We find the committees of some institutions place at the disposal of their officers small sums in order to defray their travelling expenses. Occasionally we read in the papers of the presentation of a purse as a testimonial to a medical officer.

It follows from the circumstance that they are honorary that the medical officers are not bound to give notice of leaving, but do so by courtesy only; and that they are not bound to supply reports to the committees. This would be otherwise were they to receive salaries.

10. *Nursing in Hospitals.*

There has been much attention paid to this subject lately, and the system of nursing is becoming improved in this country. In English hospitals we generally find a paid matron and night and day nurses. The latter are trained in different parts of the country; for instance, in Bath, Lincoln, Bristol, &c. Lately Protestant religious orders (I think there are three at present in existence) have begun to take charge of the nursing,* but the common nurses are always lay nurses. In France, however, the whole system of nursing is in the hands of religious orders. All the nurses (*religieuses*) are nuns, superintended by sisters called *sœurs surveillantes*; male attendants are employed as little as possible. In Italy, where nuns

* University College, King's College, Charing Cross Hospitals.

do the same work, the male sex is also represented by monks, and to a greater extent than elsewhere. In Germany sisters of charity begin to be more generally admitted: one celebrated training institution is at Kaiserswerth (Diaconissen-Anstalt), but male nurses and married couples are frequently employed. In Russia we find, besides the latter, sisters of mercy in some establishments, especially in children's hospitals.

As regards the sex, I think males less desirable, except in military hospitals. In private life we always prefer females as nurses to males, because it is more in their nature to attend kindly to sick people. In hospitals male patients do not object to female nurses, but females very much to male attendants. Females understand all those little things which contribute to make a ward comfortable and cheerful. They are more patient and vigilant,* and devote themselves with more earnestness to their arduous duties than men.

The next question which arises is, should orders be preferred to lay nurses? The question has been principally discussed in France, where the medical men complained frequently that they had not enough authority over the *sœurs* and *religieuses*. The latter did not always comply with the orders about diet or other things; and complaints made to the superiors had only the effect of removing the refractory nurse to another ward, where she acted in the same manner. In London, where the orders have lately begun their activity, similar conflicts of the different authorities have occurred, and will not be absent (such happened at King's College with the chaplain); but I am informed that the medical officers are generally very well satisfied with the system, and they consider it an improvement. In Germany, I know the Protestant orders are highly valued, and so I am inclined to think that hospitals in this country need not be afraid of handing over the nursing to a Protestant order. One condition is, however, essential, and that is, that they refrain from proselytism. As regards the patients, they do not object to religious nurses.

Ladies have tried their hand as amateur nurses, but I believe they are a failure. Their well-meant efforts are not always crowned with success. To mention one instance: the soldiers in the Herbert Hospital (Woolwich) do not like their lady nurses, and nineteen out of twenty call for their old ignorant nurses. These ladies are too much

* When I was a resident medical officer at the Charité Hospital (Berlin), I had to visit the fever-wards (*Wachsäle*) late at night, and sometimes found the male attendants sleeping. One used to stretch himself down before the door that he might be awakened by the noise of the turning of the handle.

above the station of the sick in hospitals, and however willing to do the meanest services, are not so fit for them as other nurses.

Unpaid pauper nurses are the worst of all. I have seen them, and generally found them weak in body and mind. But worse than this, they have been found purloining articles of food, and helping themselves to brandy, gin, and other extra diet of the patients. Some of them have even acted with unpardonable cruelty to children and lunatics, and horrifying accounts about it have been published by the press. They are certainly as useless as they are ignorant, and do not know how to help themselves when anything unforeseen happens.

All nurses who do not belong to an order ought to be paid, and their wages should be a little higher than that of domestic servants, because they run the risk of infection. Their dress should be plain, of dark or darkish colour, certainly not scarlet (as in Reading); a clean white apron is very neat and handy.

It is important that nurses should sleep as far from the wards as possible;* and their comfort in general should not be neglected. Scrubbing is not nurses' work, but ought to be done by servants. Nurses should be boarded, have their washing done, and in fact every care taken off their shoulders but that for the patients.

A separate class of night nurses is generally found in English hospitals. I consider this an evil (*see* p. 165). To take persons of inferior qualification and pay them less wages for night service may be economical, but it should not be done. Patients want as good attendance at night as during the day time. Besides, the continual change of nurses is objectionable. All nurses should live in the house, and have the night-watch by rotation. All should be engaged by the same authority, be it a matron, an inspector, or house-governor. They should be in every way fit for their office as regards sobriety, state of health, &c.

It need scarcely be said that nurses must perform their duties in a noiseless and pleasing way, be kind-hearted, attentive to the patients, and satisfy the medical officers. Their dismissal may be immediate, in case of serious offence, evident neglect, or inhumanity; but generally they are discharged by notice according to agreement, just like domestic servants.

The number of nurses varies according to the means of the charity and the helplessness of the patients. Too many would be

* Extra waste of oxygen during the day is compensated by large absorption of it during the following night. Pettenkofer states the amount absorbed per night at 67 per cent., and only 33 per cent. per day.

as undesirable as too few; one would be in the other's way. I should not recommend what was done in the Commercial-street cholera hospital: each patient had his or her lady-nurse. In French hospitals and in Vienna, where the number of nurses is not so variable as in England, one nurse has to superintend about ten beds, to attend to the comfort of the patients, and that they receive their food. They certainly should not have more under their care, because it has been found sometimes that they are hardly able to fulfil their duties under the circumstances.

No rules and regulations can make good nurses. They learn their duties and must be educated (trained, as it is termed) in hospitals. This is one of the ways by which these institutions do good service to society.

III.—ON SPECIAL HOSPITALS.

There is no city in the world where they flourish in such number as in London. What I am going to observe about the matter will therefore principally have reference to this metropolis. With few exceptions the special institutions are of recent origin, and the time is not very remote when scarcely any existed. Those who have the greatest claim on public support are older than the others. Many years ago it was found incompatible, not only in this country but on the continent too, with the interests of a general hospital to harbour certain cases of contagious disease inside the walls. Incurables, too, were excluded from many institutions, but the regulations were not so strictly observed. Syphilitic patients were not admitted into some hospitals on religious grounds, and therefore the promoters of separate institutions (Lock hospitals) found favour with the public. The privilege belonging to the governors of making illiberal rules with regard to admission afforded ample opportunity for those whose purposes it suited to promote special establishments. Lately the number has increased in such an alarming manner that it is high time that public notice should be called to the matter.

No doubt many things can be said in favour of special hospitals; and I may be allowed to consider both sides of the question, and afterwards decide in some manner which institutions most deserve public support.

Some special hospitals are as much needed as general ones, viz., small-pox or orthopædic hospitals; some are most useful, for instance,

convalescent hospitals; and some have a claim on our support as means of medical education, such as eye infirmaries. As public generosity is ready to come to the assistance of those poor who are afflicted with special diseases, why should it not be engaged in this direction? Besides, the special hospitals relieve the general ones of a number of tedious cases which they do not care to admit. The public, even though there are special institutions, can yet avail themselves for almost any case of the general hospitals.

But as soon as the special establishments multiply in such a manner that for almost every disease one is called into life, they become a nuisance and an absurdity. The means of the subscribing public, which is limited, become squandered in a disadvantageous manner, the celebrated medical schools are robbed of many cases which would afford valuable instruction, and a number of small establishments are founded, which cannot be under proper public control. The principal advantage is derived by those who have a certain interest of their own for promoting their institution.

I now come to submit the merits and usefulness of them separately to the judgment of the reader.

1. *Convalescent Hospitals.*

Usually one-third or nearly so of the patients of a general hospital are convalescents. The day rooms are useful for removing them temporarily from the wards; and in a larger hospital it is even easy to send a large number of convalescents from the clinical wards to those for lighter cases, but even here they must soon make room for others. This is the reason why they are discharged and become out-patients sooner than is safe, at least in most hospitals in large cities where many wait to be admitted. The consequence is that the patients have a relapse of their disease or make a very slow recovery. They go back to their comfortless unwholesome lodgings, which perhaps are at a great distance from the hospital, to which they have to come for advice as out-patients. They want something more than proper physic; they want good air, proper nourishment and attendance, being in a state of weakness or debility. Take the cases of rheumatic or other fever which have to be discharged from the general hospital according to the rules, or because room is scarce after they have been there six or eight weeks. Can it be expected that they will readily recover their strength when living in badly-ventilated places, and on food unfit for their enfeebled constitution? Send them to a climate which suits their state of health, and they will soon experience a remarkable change for the better. Send them to the country or the sea-side, for the

same reason that private patients are sent there. Of course, not every hospital can have an institution in the country attached to it, nor is this necessary. There is one Metropolitan hospital (Charing-cross) which has a sea-side establishment of its own; another (St. George's) will have one at a not very distant period; but there are others to which patients are sent from various institutions, viz., the Margate Infirmary, the Convalescent Institution at Walton-on-the-Thames, at Southport, at Bothwell near Glasgow. Dispensaries and poor-law boards might become subscribers to such establishments; there are many localities nearer London where they might be established, such as Tunbridge Wells, Hampstead Heath, or Kew. And they should certainly, as Miss Nightingale suggests, be as like a home as possible: we do not want so many nurses, nor such strict superintendence as in hospitals, nor are there the same objections to small wards. But as regards the construction I would hardly recommend the plan of cottages. It must necessarily reduce the number of those who can be benefited by this establishment, because no other plan is so expensive. And why should we select cottages? We may accommodate the convalescent patients comfortably enough without them. It is scarcely necessary to suggest a plan of building; but I should think that two pavilions in a line might be safely adopted, or two such blocks communicating by a corridor, as in the military hospital of Vincennes, but on a smaller scale. The dormitories may contain four or six beds; waterclosets and drainage must be arranged exactly on the same principles as in hospitals, and all modern improvements, unless they cause too great an outlay, should be found in kitchen and wash-house. Care is to be taken that the grounds are kept in a cheerful state, and invalid carriages must be at the disposal of the inmates requiring them.

It is highly desirable that adult convalescents should be sent into the country; it is also necessary that a children's hospital be connected with a country institution. It is a great boon to the inhabitants of these islands, that they can send their young ones to the sea-side. Wherever one lives, the sea is within easy reach by railway, and Londoners especially are not a little indebted to the sea-side sojourns for the preservation of the health of their families. If the sea air is serviceable to them in general, it is a necessity when they are in a state of weakness by disease. It is true that children can be easily accommodated with lodgings in the country or sea-side places, and this is done every day; but hospitals offer a better guarantee for proper medical attendance.

As regards continental countries, the necessity of having country establishments is not overlooked in France; in Germany the nu-

merous mineral spas are used as health resorts for children no less than for adults. The little patients are specially sent to the mother of lye spas (Kösen, Kreuznach, Rehme, Ischl, &c.), and the communities pay for them (Armenbad).

2. *Lying-in Hospitals.*

The principles on which these hospitals were formerly constructed and managed were bad in themselves, and bad in their results. At the time when Tenon wrote his memorable book, at the Hôtel Dieu women when actually in labour had frequently to divide their bed with two or three others. In other continental cities the large lying-in hospitals were overcrowded. There is no doubt in the minds of medical men that the ravages of puerperal fever would never have been so fearful, if the sanitary principles of the present time had always been acted upon. There are some who still deny that this dangerous disease is infectious, but I do not belong to that number. I must refrain at this place to support my opinion by facts; but I may safely assert that in constructing lying-in hospitals the disease in question must be specially considered.

Some physicians have advised the total suppression of lying-in infirmaries, because the mortality of women delivered at their homes is said to be less than of even well-managed institutions. I am inclined to believe that there is a great deal of truth in the assertions of those who describe the hospitals as dangerous. But the statistics to which they refer are most unsatisfactory. I do not consider females exempt from all danger at their own homes. Puerperal fever, although originated and more fatal in hospitals, is well known in private practice. It occasionally happens that one practitioner loses a great many of his patients by it. For instance, a few years ago the fever made its appearance in a small place in Lancashire—I forget the name—and the doctor was unfortunately considered the means of propagating it. He and his assistant had to give up midwifery practice, and the female patients fared better under another practitioner. (See *Medical Times*, Dec. 1866.)

The necessities of a great many persons militate against the total suppression of the infirmaries in large towns. A large class of females cannot be delivered at home; such as servants, single women, and females deserted by their husbands. It is the general opinion abroad, that few females in London are confined in hospitals, but it seems to be overlooked that many are received in workhouse infirmaries, to stay there over their delivery; and this is just the class mentioned. The number of beds of the lying-in wards of the forty London workhouses is nearly three hundred.

It has further to be considered that some lying-in hospitals ought to exist as means of clinical instruction. Some of the existing institutions are of great value, from the opportunities they afford to the professors to teach and to the pupils to learn the principles of midwifery.

Supposing it necessary to have lying-in hospitals, we have to consider their dimensions. It might be almost sufficient, if I draw the reader's attention to the bare fact that at the present time the large institutions of the kind in Paris and Petersburg are suppressed, or on the point of being vacated. Statistics, as far as my humble knowledge goes, are not so convincing that small establishments have a much lower death-rate than larger ones. But common-sense, and the sad experience of former times alluded to above, lead us to give the preference to small lying-in establishments. Last year the opinions of the best authorities in Germany (Virchow, Hecker, Oppolzer, and many others) were collected on this and other points respecting such hospitals, and small ones were recommended almost unanimously.

I should think that about forty beds would supply the wants of a population of 500,000 inhabitants, as the greater part can be treated as out-patients. It would be desirable to have the building removed from noisy thoroughfares, and in a healthy situation, surrounded by gardens.

It is most likely that those buildings will answer the purpose best which are constructed on a mixed plan, half-block, half-corridor plan. The common dormitories and larger rooms, containing twelve beds and twelve cribs each, should have opposite windows; but as many small rooms are required, these must open into corridors.

The sick wards should be in a separate infirmary, and patients attacked by small-pox, measles, or scarlet fever, should be removed to a separate shed built for the purpose.

The ward where the persons are actually in labour must be separate from, and not too close to the dormitories of the females attending their delivery. Those who have been delivered are transferred to their cells, which afford ample cubic space. Here they should be kept nine days, unless they fall ill; in which case they are removed to the sick-ward. But should a patient be attacked by puerperal fever, she must be separated from other patients.

After staying nine days in their cells, the females should become inmates of the common convalescent ward. Those who are weak after illness, should as soon as possible be removed to a convalescent institution. As one cell could accommodate about forty patients per year, ten would be sufficient for 400 females delivered at the institution.

An establishment constructed on these principles would combine the advantages of a hospital with those of a private room.

The principle on which females are admitted should be liberal—more in the Irish than in the English way. Married women prefer to be delivered at their homes; those who would be thankful for admittance are unmarried, and they are just excluded by the regulations of London lying-in charities. The result is, they often fall into bad hands, as they dislike to apply to the workhouses.

As I am going to explain in another place, the assistance given by the London parishes to these poor creatures is not quite satisfactory, because the medical officers have too much on hand to give them the necessary attention. The loss of life, I am sure, would be less, if this state of things were ameliorated.

On Preventing Measures as regards Puerperal Fever.

In one city (Berlin) the regular transfer of all the patients from one house to another is adopted. In Dublin (Rotundo Hospital) as many beds are untenanted as are occupied; in Paris* the administration had the wards divided by double glass partitions, but recently they have gone farther, and recommend single bedrooms. On whatever plan the hospital is constructed and managed, there should be the means of transferring any suspicious case at once to a separate building.

It is important that the younger members of the medical pro-

* The debates on the subject in the Surgical Society of Paris, in which Trélat, Le Fort, and Tardieu were principally engaged, led to the adoption of the following conclusions:—

“1. It has been proved by statistics, that the ravages of puerperal fever in lying-in hospitals are greater now than formerly. This can only be referred to the hospital atmosphere; therefore the infirmaries and hospitals should be reduced in extent, and assistance provided to the poor at their houses.

“2. Puerperal fever is infectious, and therefore hospitals constructed on the best principles may become the scene of great calamities.

“3. Besides the usual sanitary measures which are recommended for hospitals, special precautions should be observed in lying-in institutions.

“4. To avoid importation of the disease strict cleanliness should be observed. Empty wards should be thoroughly cleaned; not only the walls whitewashed, but the beds purified, &c.

“5. To avoid the spread of the disease, the healthy should be removed from the ward where any have been attacked to small rooms for one, or at the most four beds.

“6. The attacked should be removed to a separate building.

“7. If, nevertheless, the remaining females get the fever, the whole building must be emptied.

“8. In cities where lying-in hospitals cannot be dispensed with they must be small.”—*Gazette des Hôpitaux*, No. 67, 1866.

fession—viz., the house-surgeons and medical officers who attend upon the patients, should be well instructed as regards the symptoms and nature (so far as science goes) of the puerperal disease, well aware of its spreading by infection, of the necessity of using none but well-cleaned instruments, and to wash their hands thoroughly after every examination. The nurses must be trained, and understand the importance of keeping the patients and rooms clean. They must be careful not to overlook any change in the state of the females under their supervision, and the visiting physicians must take prompt measures when needed.

With every care based on past experience and judicious principles, it may and will happen that this dreadful malady will make its appearance, just as cholera or other epidemic diseases beyond human control.

APPENDIX.

Institutions for Training Midwives.

PRUSSIA.

These institutions are called Hebammen-Institute. The director of an institution is a medical man, and generally a professor of midwifery. He gives lectures to those who are admitted as pupils, and this is done almost every day as long as the course lasts—viz., four months. The midwives live in the house, and are under the superintendence of a head midwife, who lectures, and also repeats the lecture of the master. The midwives attend midwifery cases in rotation, and are admitted to the post-mortem rooms.

Those who are deficient in the elementary science of writing, &c., receive special instruction, for which purpose a teacher attends.

After they have gone through their course, they are admitted to an examination. Those who pass it get a licence, and are appointed by the Government as approved midwives for a district. The persons who are admitted to the midwifery schools are generally sent by the communes or municipalities of country places; and, according to an Act passed in 1861, they are often recommended and elected by the ladies of the place. They usually return to the place where they come from.

The training is much facilitated by a book which every midwife is bound to study—the “Hebammenbuch.”* It contains the prin-

* “Hebammenbuch für den Preuss. Staat,” edited by a committee, but written by the late Dr. Jos. H. Schmidt; in my opinion one of the most useful books ever published.

ciples of the art and science of midwifery in a popular manner, and many useful hints respecting the conduct of midwives in practice. They are bound to send for a doctor in irregular cases, and not permitted to operate where a practitioner can be fetched in time. It is, indeed, rare that they overstep the limits of propriety and interfere with medical advice.

AUSTRIA.

In Austria these institutions work in a similar manner. They are connected with the universities, and that of the Allgemeine Krankenhaus, in Vienna, has the greatest number of pupils. (*Gebärclinik*.) The director is generally a professor of midwifery at the university. The course the midwives have to attend is of longer duration than in Prussia. They have to pass an examination before being appointed. The expenses of their education are usually paid by the municipalities who afterwards require their services.

FRANCE.

The principal institution for training midwives is the *Maternité de Paris*; free courses of lectures are, however, given at the university. The *Maternité* is intended for training midwives for the whole of France; but some are educated in the provinces (*Strasbourg*). They also are taught how to vaccinate children, and the course of training lasts one year. The pupils are boarded and lodged in the institution, and the communes bear the expenses (600 fr.)

RUSSIA.

Midwives are trained in the lying-in hospitals of Petersburg and Moscow; the course lasts three years. At the end of this time they have to pass an examination to get a licence. They also learn to vaccinate. They are appointed by Government for a certain district, and one class, called *Crown-midwives*, are better off as regards emoluments than the others: they receive a fixed salary as soon as they have passed their examination.

The regulations respecting character are almost the same in the various countries named; but those regarding the age of pupils to be admitted are different.

There are other things arranged differently: but the most striking one is, that the time the course of training lasts is so variable. Should institutions of the kind be founded in this country, this point would have to be considered. Where the number of practitioners who attend to midwifery cases is large, as in Paris, it may, of course, be supposed that the midwives attend regular cases only,

and medical men are always at hand should anything happen. At present, a few midwives only receive a practical training at Queen Charlotte's, Guy's, and King's College Hospitals. The Ladies' Medical College, of which I know but little, is not only intended for training the pupils to become useful midwives, but they receive a general medical education, or, at least, one respecting diseases of women and children. It may not be intended to call into life a class of female doctors, who do more mischief than good; but I must confess, that from the prescriptions which I have had occasion to read, I cannot augur well for the benefit conferred upon the female part of the community by these half-learned doctors. What is wanted in a large city like London is that useful but humble class of midwives who, being well qualified, are able to act as occasional substitutes for practitioners.

3. *Children's Hospitals.*

If the sick children of the poor were well lodged and attended at home, there would be no reason to remove them. A mother's care cannot be replaced. But, unhappily, the children do not often dwell in places where they have a fair chance of recovery from diseases. Now, to admit them into the wards of a general hospital could not be recommended. These wards satisfy the wants of adults, but not children. A few cribs are found; but often the children are put into the bed for a full-grown person. They are not even supplied with proper spoons or tumblers that they are able to handle. There are other things to consider; for instance, that the children see many things which are not fit for their view. In many hospitals, children are received into separate wards. This is much better, but not satisfactory in every respect. Under these circumstances, they are better cared for; but they can hardly have their own separate playground, which is essential to them; and the out-patients' department is not separate. Therefore, children's hospitals were founded in large cities like London, Berlin, Paris, or Vienna. But no one can deny that these institutions, however useful, have their own dangers. The eruptive fevers—measles, small-pox, scarlatina—cannot be excluded; first, because many children are sent to the hospital before the diagnosis is clear; secondly, because these cases cannot be treated at home. Those children who have no eruptive fever are endangered, and even those who recover from one may catch another fever. Therefore a Children's Hospital ought to be constructed as much as possible on the principles of a general hospital as regards separation of contagious diseases. One or two separation wards must be found, with a separate entrance; and they

ought to have even a separate medical officer, who does not attend to the other patients.

The construction of the hospital offers few difficulties, as the number of patients must not be large. The larger the number, the higher the death-rate. A small Children's Hospital can be constructed without endangering the patients, and by connecting an out-patients' department with it, afford relief to numerous sick children. The cubic space children require is a little less than for adults. Beds, utensils, baths, must suit their age, and the latter be on an extensive scale, to be used by out-patients as well. A large playground should be attached. Cleanliness is of as much importance in a children's as in a general hospital; and continuous attention must be paid to the water-closets.

Children's sick nurses must be trained, and for this purpose the hospital is the best means. They must have a gift of observation, by which they are able to supply the attending physicians with useful information about the little patients.

The diet and supply of good milk is of importance, and requires the special care of the resident medical officers.

No patient ought to be kept longer in the establishment than is absolutely necessary.

4. *Hospitals for Incurables.*

For this metropolis only two establishments called Hospitals for Incurables exist. One is situated near Putney Heath; it is a recently-constructed building (1851), and creates a favourable impression by its exterior; but it affords a retreat only to a limited number of inmates—about 100. They are elected for life by the governors of the hospital, and do not belong to the poorest class. The great mass of incurable poor find a refuge in the workhouses.

In France, some of the *maisons de retraite* are at the disposal of this class of the sick poor. The hospitals for incurables—two in number (*Incurables Hommes* and *Incurables Femmes*)—are quite different from the above-named institution, and must be considered under the heading "Workhouses," to which they are similar.

A cancer hospital is an establishment for a certain class of incurables, as the name implies. I do not think that there are more than one or two in existence (London, Liverpool); and they could be dispensed with. They are not found in Germany, where the name alone would be sufficient to deter any patient from applying for admission.

Numerous establishments exist in Germany for the incurable

poor; but I do not know of any for incurables alone; and it is the same in Italy, with one or two exceptions.

5. *Hospitals for Consumption and Diseases of the Chest.*

The fact that four hospitals for diseases of the chest are found in London, supported by voluntary contributions, seems to prove that they are a necessity. It was a matter of serious doubt when they were formed, if they were necessary, and would find favour with the public. As the applications for admission are so numerous that they can hardly be granted, we may be satisfied about the latter point. But on that account it does not at all follow that special hospitals for consumption should be built in all large cities. In London, many hospitals do not admit incurables; and the visiting of poor patients is not carried on so efficiently as, for instance, in continental cities. The London parish medical officers and their (I am sorry to say) unqualified assistants have to attend to a district far too large for their strength; and only in some parts of the town, dispensaries make it their business to come to their aid. Therefore many poor persons afflicted with consumption are glad to find a temporary asylum in a hospital, where they enjoy a proper diet and medical attendance, and are removed from the noise and bustle of their unhealthy lodgings.

It might be urged against the special hospitals for consumption, that it can hardly be conducive to a favourable progress of the malady for the patients to have constantly before their eyes the sufferings of their fellow-patients, and often the fatal termination of the disease. We take great care in private life not even to mention such a contingency as death in presence of invalids. But, singularly enough, phthisical sufferers hope against hope, and do not despair even when they have such plain facts before their view. There is another difficulty, that of keeping the air in the wards sweet, especially where the worst cases are. To ventilate by opening the windows, is often out of the question; and it is well known that artificial ventilation can only to some extent make up for this.

I have further to mention, that the expenditure is always considerable, as a large number of nurses, expensive medicines, and nourishing diet are required.

All this has to be considered should the erection of a new consumption hospital be proposed; and I draw attention to it without in the least denying the services rendered by existing charities to the public.

6. *Eye Hospitals.*

Ophthalmic surgeons are unanimously of opinion that a separation of eye patients from surgical cases is necessary. The success of operations on the eye is endangered if the patient is subjected to the influence of a "traumatic atmosphere."

Some are not satisfied with separate wards, but insist upon special hospitals. It mostly depends on local circumstances if a separate building is desirable. It is quite possible in a new institution to build an eye ward, fulfilling all the conditions for the favourable recovery of the patients. The latter may judiciously be accommodated in a separate block (Guy's Hospital). But if a new eye ward has to be founded in an old building, where the space is limited, the difficulties may often become insuperable. The number of beds and extent of the building depends so much upon the reputation and celebrity of the head surgeon, that no rules for it can be laid down. But as the greater number are out-patients, the accommodation is specially limited. We find, however, at Turin* an eye hospital with 300 beds.

The construction of an eye ward offers no difficulties. As light and sun are to be excluded, it should face the north; it must be easy to darken it, therefore the windows are high up, and have curtains and blinds (Venetian if possible), and some of them sliding shutters.† Small wards are preferred for this class of patients. Operative cases ought to have separate rooms, especially cataract patients, who must be kept exceedingly quiet. I need scarcely mention that each patient must have his or her own basin, towel, sponge, &c. A light operating room and a small dark chamber for examination with the ophthalmoscope should adjoin the ward. It is well to make arrangements for eye douche when the hospital is constructed. The out-patients' department is on the ground floor. For operating table, see p. 93.

7. *Fever Hospitals.*

There can almost as much be said in favour of them as against them. In countries where the general hospitals do not exclude fever patients, as on the continent of Europe, special fever hospitals do not exist. But many hospitals in England do not admit these patients, and they must be accommodated somewhere. So long as the present system of admission exists, these special hospitals

* Graefe's Eye Hospital, at Berlin, has 120 beds; that of Vienna, 60; of Glasgow, 24; Halle, 50; Prague, 150; Heidelberg, 64; Moorfields (London), 40; Bradford, 18. The smallest number in Germany is found at Darmstadt (15).

† See Bradford Eye Hospital.

will be necessary. The class who cannot remain at home are servants, male and female, clerks, and sometimes foreigners. They dislike or object to be removed to workhouse infirmaries, and find the proper accommodation, treatment, and nursing in the special hospitals. Their friends or fellow-lodgers derive certainly a benefit from their timely removal to such institutions, as otherwise they might catch the disease.

On the other hand, any one can well understand, that, as far as London is concerned, we cannot have fever hospitals all over the metropolis, and that to send fever patients long distances, even in proper conveyances, inflicts great injury on them. The state of exhaustion in which they arrive is often fearful, and the fatigue of the journey has a bad influence on the course of the disease. It has further to be stated, that the recovery of patients afflicted with zymotic diseases is generally less rapid and perfect when collected together in special buildings. Pyæmic and puerperal fevers have been found to improve when the patients were removed from the wards where so many were suffering from the same disease. Medical men of considerable authority observed that their typhoid patients fared worse when a great number was kept in the same ward, and better when more widely distributed over several wards.

A special difficulty is experienced in providing nurses, as so many of them catch the fever and die, and the resident medical officers of fever hospitals are far more in danger of falling victims when performing the duties of their office, than those of general hospitals. It might even be feared that the whole neighbourhood of a fever hospital becomes endangered; but fortunately this does not appear to be the case, at least I am not aware of such a case having happened.

Trustworthy statistical reports are much needed, to guide our opinion on the desirability of having a fever hospital in a certain locality. It sometimes happens that the hospitals are founded where they are little used afterwards.

It is desirable that in every large town those sanitary measures (respecting drainage, water supply, &c.) be adopted, to the neglect of which the prevalence of fever and zymotic diseases in general is ascribed.

In the construction of the hospitals themselves, less care should be bestowed on arrangements pleasing to the eye than the proper supply of drinking water, good sewerage and ventilation. Every regulation that can be made for preventing the propagation of the fever inside the building should be strictly observed, and no precautions respecting interment and disinfection neglected.

The best plan of constructing a fever hospital is the pavilion plan,

as the officials connected with it must live quite separate, and different classes of fever, such as typhoid and eruptive fever, should be under different roofs. Small wards are objectionable, as they make nursing and supervision troublesome.*

8. *On Lock Hospitals, Samaritan, Orthopædic, and some other Special Hospitals.*

Syphilitic patients are better separated from the others, not only on their own account, but also because they are a danger and an annoyance to the others. But it is questionable if separate hospitals are necessary and whether separate wards could not suffice. There are large towns of more than half a million of inhabitants (Berlin, Vienna) where no separate hospitals exist. Although the number of the class of patients in question is large, yet few like or need be in-patients: their treatment at their own dwellings depends much upon local circumstances. In London, where the fees for proper medical attendance are comparatively high, there may be more reason for recommending lock hospitals than in Berlin or Vienna. In sea-faring towns, where many foreign sailors are always found suffering from the disease, and female patients of the same description are unfortunately not rare, lock hospitals will render great services to this class and to the inhabitants; for the spread of the disease may be somewhat prevented by removing the patients in time to the hospitals.

Respecting the dimensions, no fixed law need be stated. In Paris, where other regulations for admission are followed, the lock hospitals are larger than in London. There are about 300 males in the hospital Du Midi, and a few more than this number can be accommodated in the female lock hospital, the Lourcine. To keep separate establishments for both sexes would not be practicable in small sea-faring places.

Lock hospitals, where they exist, do not make lock-wards in general hospitals unnecessary, but some of the latter may thereby be enabled to exclude venereous diseases from admission altogether.

Lock hospitals may as well be constructed on the corridor system as on the pavilion plan. The cubic space the patients require is less, as they are not constantly in bed, and the windows can be used freely for ventilation. There should be large wards and smaller ones, as patients with gangrene, or those who have been operated upon, must be removed to private rooms. Special care should be bestowed on the common bathroom, and the opinion of medical men consulted on the subject before the hospital is

* See Leeds Fever Hospital.

constructed, as it is somewhat difficult to make arrangements for medicated and vapour baths, and vaginal injections (the latter in female lock hospitals) after the building is finished.

The rules for discipline should be somewhat stricter than in general hospitals, and cleanliness be insisted upon by the medical officers as much as elsewhere. Such skin diseases as itch, favus, &c., should be rarely treated as in-patients, but the efficient means for treating and curing them as out-patients might be found in connexion with lock hospitals.

Samaritan Hospitals for Diseases of Women.

The reason why they have, under circumstances, a claim on public support is, that some persons who suffer from female complaints find it difficult and injurious to visit the dispensaries as out-patients, and others must be treated as in-patients after certain operations.

Orthopædic Hospitals.

They are a necessity on account of the particular treatment the patients have to undergo, the many bandages and appliances which must be kept in store, and because of the length of time many patients must remain for their cure, this being quite incompatible with the rules of a general hospital.

Other Special Hospitals.

Fistulæ and stone diseases might very well be treated in the surgical wards of general hospitals. Dentistry is conveniently connected with the out-patients' department of the same or with public dispensaries.

9. On Lunatic Asylums.

Public attention is rarely drawn to the construction of lunatic asylums, although numerous pamphlets and works exist which treat on the proper management of the insane. It seems to be desirable that modern sanitary principles should be as well acted upon in the construction and arrangement of these special institutions as in general hospitals. In France they are on the point of improving considerably the institutions where the insane are to be accommodated, as I understand that a number of new country asylums will be built on the pavilion plan. This is preferable to other plans, because it allows a stricter separation of different classes of patients, for instance of the refractory ones and others. In Germany some institutions, closely connected as yet with general hospitals, will be removed to special buildings. It is evident, that although serious differences exist between both class

of hospitals, yet the principles as regards cubic space, ventilation, bedding, cooking, &c., must in some manner be the same.

A site in the country is preferable, because large airing grounds must be attached to the institution, and the patients must have work as tillers of the soil or in the gardens. To connect a large farm with the asylum is a good plan, but is not likely to find much favour on the continent. The dimensions of the institutions are not restricted by the fear of hospital diseases, but only by some difficulty of management if they become too large. There would be no objection to have the buildings three or even four floors high, but the latter is not likely to be adopted, because they are situated in the country, where ground is of less value than in town. The fluid manure of the asylums should be used for the soil, the water supplied by wells, the rain water carefully collected, and steam used for domestic purposes, as in hospitals.

The construction of the windows requires particular attention. In the first place, they must not give the house the look of a prison. Unsightly iron bars can be avoided at any rate by the bars corresponding to the framework if this is of wood. But it is more simple to have iron window frames, which prevent any attempt at escape, and louvres for ventilation; sash windows, that can be partly opened, may be used in the convalescent wards. In that part of the building which is used as an infirmary the windows must not only be available for ventilation, but have bars to prevent escape. All the windows might have double perforated zinc plates, or tablets at the top sliding one over the other, so that more or less air can be admitted.

The largest wards may be used as day-rooms, made as cheerful as possible by painting the walls, having open fire-places (surrounded by fire-guards) window-curtains, hearth-rugs, flower-stands, aviaries, &c. The dormitories might be to some extent single ones; too many of them make superintendence difficult: they should have a small window, and contain a bed with horsehair mattress, a chair, bedside-carpet, and allow a cubic space of about 1000 feet. This will be sufficient, because they are not occupied in the day-time. In the common dormitory, which may accommodate 50 or 60 inmates, the beds should have a space of $3\frac{1}{2}$ or 4 feet between them. Each dormitory should have a separate night attendant. I do not see the necessity for the beds being folded up; it causes a great deal of trouble and looks prison-like.

Patients who are unclean and wet their bedding (idiotic boys) should have strong wooden cribs with double bottom, the lower one containing zinc lining. Strong canvas is slipped on side-poles

which fit to the side of the bed. The mattress is placed on the canvas. All urinals should be self-acting.

What separation rooms are to a hospital, padded rooms are to an asylum; with this difference, that they should only be used temporarily. It is indeed rare that patients are at present secluded from others for days.

Many plans have been proposed for the construction of seclusion rooms. First as regards their situation: although they must not be too near the other patients, they must not be in dark and damp cellars (*see* Hamburg); although not very light, they must not be quite dark; one or two small windows near the ceiling would be sufficient: then they must be ventilated by perforated zinc plates in the wall and other means; where a number of them lie side by side, air may be forced in by a fan, and in winter time this air should pass over hot plates. As regards the walls some propose smooth wood, others cement which can be washed, or glazed tiles. I do not think anything is better than padded walls, as described under Colney Hatch.

The frames are too high from the floor to be removed by the patient, and the canvas if made dirty can be washed. The doors should have small shutters which can be opened for offering food to the patient, and eye-holes for allowing the attendant to observe the inmate; the doors are fastened by a small hinged board, stemming against the outer frame: locks might be broken.

Some difficulty is experienced about the convenience. As common waterclosets are objectionable, because the patient might break the handle or pan, and the self-acting closets cause a great waste of water, it has been proposed (Esse) to have a basin with a small hole, so that the hand cannot pass through, communicating with a syphon-pipe with a double curve; the water supply to be permanent, but limited. This is said to answer well. We often find a simple vessel (of iron or gutta percha) placed in a corner, so that it can be removed without opening the door from the corridor. I think it is only necessary to direct the attention of engineers to the subject for us to be supplied with a suitable article.

If the aperture of a small basin of one of Jennings' closets was placed at the side, and the water allowed to rush in by the attendant pulling a cord outside, I think nothing more would be required.

Management of Asylums.

Much can be said for medical men being at the head of such institutions, and this is generally found to be the case on the con-

tenant. But in this country committees manage the affairs. It can be scarcely supposed that those who know nothing about the nature and treatment of insanity are able to act with judgment in every case, and in fact we find committees frequently committing acts of great inconsistency. I can prove from reports of lunatic asylums that in one meeting a resolution is often carried which is repealed in a subsequent one. It is easy to understand that the members sometimes come to wrong conclusions based on the report of ignorant officials. The patients themselves are unfortunately not able to apply for redress if they are wronged. It might be said that the committee may avail themselves of the advice of their superintending medical officer, but they act often against it.

There should be an inspector and sub-inspectors where the number of inmates is large, and they should be bound strictly to follow the orders of the medical officer.

The medical officers should be as little as possible restricted by economical reasons, and allowed to use every available means for curing insanity; and they should be *ex officio* members of the board, without the power of voting. They should not have more than 250 patients under their care.

10. *Military Hospitals.*

They can hardly be called special hospitals, because no special class of diseases is treated in them, but they are general hospitals for a special class of inmates, and are under stricter regulations. In most respects they should be constructed on the principles laid down for civil institutions, but in general, economy prevents this to some extent. In most countries there are only few military hospitals which can in any way rival the civil establishments. In this country improvements have lately taken place. The new regulations, for instance, require that every military general hospital should have a day—a convalescent room—and should be properly ventilated. In Germany, as yet, most of the military hospitals are not buildings constructed for the purpose, but barracks or other public institutions. In a few cases improvements have a trial; for instance, in Vienna. In the first army corps hospital we find an artificial system of ventilation. The hospitals of Vincennes and Woolwich are on improved principles. In Berlin a royal commission now takes these matters into consideration.

In this country the principles of ventilation laid down by the Royal commission on barracks have been adopted. The wards have a chimney-fire, or remodelled firegrate, and inlets for air by openings near the ceiling, which can be closed, one between two windows;

the latter are frequently tilted inwards, and the upper open space is covered by perforated zinc. The outlets are air-shafts opening near the ceiling, and placed in the corners of the room. One square inch of the aperture in the wall corresponds to fifty square inches of the ward. The upper part of the shaft, carried four feet above the roof, is protected by louvres.

Whereas the rule in civil hospitals is to have as few male nurses or servants as possible, it is just the reverse with military institutions. There are small wards to accommodate sick officers.

In an English regimental hospital the following persons find accommodation:—The governor or commander, the principal medical officer, orderly medical officer, apothecary or dispenser; purveyor or steward, paymaster or treasurer; captain of orderlies, superintendent of nurses. Under these: the assistant-apothecary, female nurses, ward-masters, ward-orderlies, cooks, waiters, &c. But neither the commander nor the senior medical officer live in the building, but near it, having only offices there. Nor is it necessary that the dispenser or treasurer should live in the hospital.

As only few places have large garrisons in England, generally a battalion or a regiment only, the majority of military hospitals are of small size. The royal commission holds that for a regimental hospital 120 beds are sufficient. The hospital contains two wards on each floor, and on each side of a central staircase; there are only two floors. The closets, baths, lavatories, are at the outer end of the ward; the orderlies' and nurses rooms' are at the inner end.

The out-buildings are connected by galleries with the main portion.

IV. ON HOSPICES AND WORKHOUSE INFIRMARIES.

Hospices are almshouses or asylums for able-bodied or infirm paupers, supported by the municipality or Government. Workhouses are founded and governed by the parishes. Both claim our attention, because infirmaries are attached to them, and the latter receive those of the sick poor who find no place in the hospitals. The character of these institutions not only varies with the country, but depends especially upon the principles which were prevalent at the time of their foundation. Whereas in former times they were considered as dépôts of mendicity and places of forcible detention, especially in this country, those of more recent origin have

lost much of their original repulsive character, and bear testimony to the prevailing principles of humanity.

English workhouses are under the immediate control of the boards of guardians, who are elected by the ratepayers of the parish. The guardians, although in some manner subjected to a common board (Poor Law Board), possess considerable independence, and are able to do much to oppose improvements. The inmates of a workhouse belong to both sexes and every age: they are able-bodied or infirm—some incurable; and a not inconsiderable portion are insane, or idiots. Of the first only the milder forms are retained; a description of some establishments is found in another place.

Although workhouses exist in Berlin, Vienna, Petersburg, and Moscow, and other large cities, some of which I have visited, yet I refrain from describing them; but I must here say a few words on those of Paris.

They are now undergoing considerable changes, in order to apply the principles of modern sanitary science. We find four establishments of the kind for adults—viz., the Salpêtrière, Bicêtre, Incurables Hommes, and Incurables Femmes; and they provided, till lately, accommodation for more than 10,000 persons.* One exists for children (*les enfants assistés*). The number of inmates will be gradually reduced by removing some of them into the country, where new institutions are founded; especially one at Vesinez, the other at Issy. The latter is a large and fine building.

To suppress the hospices altogether was considered impossible by the Paris administration. There is a large number of helpless creatures who have neither friends nor shelter; there are those who suffer from chronic diseases, who cannot obtain accommodation; there are the semi-blind and deaf, the paralytic and epileptic, and a great many others whom it would be cruel to leave to precarious private charity. The administration send some of them into the country, and assist them with money grants; and do as much as possible to prevent overcrowding in the existing institutions.

An important part of all these institutions form the infirmaries, especially in this country, where hospitals are generally unendowed, and unsupported by Government. The recent disclosures about them must be fresh in the reader's mind, so that I need not repeat the disgraceful facts made public. At present only the metropolitan workhouse infirmaries have been subjected to severe criticism, but those in the country ought not to be lost sight of. They have as much need of improvement as those in London. The wards should be properly constructed, and arranged as much as pos-

* See pp. 168, 176.

sible on improved hospital principles ; and the institutions should be properly managed, as regards nursing, medical staff, diet, dispensing, &c.

Some of the existing infirmaries (Chorlton-Union Infirmary) may serve as models to boards of guardians who are willing to inaugurate a new system.

V.—ON DISPENSARIES.

The importance of public dispensaries is perhaps very underrated, because the benefits they confer upon a part of the sick population are not brought before the public in an ostentatious manner. A part of the profession and of the public are of opinion that all important cases of disease are treated in the hospitals as in-patients, and that out-patients or dispensary patients are pre-eminently light cases. In accordance with this opinion, medical students eagerly follow the lectures in clinical wards, but none attend as pupils in the out-patients' department, not considering that, in the beginning of their career, they will be more consulted respecting light cases than in such as threaten the life of the patient. The dispensary cases, however, even if light, may become serious or chronic. For medical students the chronic diseases of a dispensary would be an almost inexhaustible source of instruction ; but of this, singularly enough, they are ignorant. It would not suit the dispensary, or out-door patient department, to admit the pupils indiscriminately and every day, but one or two days could be set apart for them each week. Dispensaries would in this way become means of education in connexion with medical schools.

The dispensaries might become annual subscribers to the nearest hospital. This would give them the right to send such patients there who cannot be attended to at the dispensary or visited by its visiting officer. The cases, if interesting and worth publishing, should be published conjointly by the dispensary and hospital physician or surgeon, each giving his part of the history and treatment of the disease. The pupils of the hospital, who attend at the dispensary, would then follow the case from its beginning to its recovery or fatal end. The hospital physician or surgeon would have reliable information upon the history of the case, and the dispensary medical officer upon its course and termination.

Case-books are not kept in many, perhaps in most dispensaries : this is to be regretted. Many patients are under treatment for years, with short interruptions, and their disease may be well worth

noting. This could be done by pupils attending the establishment. Eye-diseases are frequently treated at metropolitan and provincial dispensaries, and they offer valuable materials for publication. Some ophthalmic surgeons of European fame owe much of their celebrity to the observations made on out-patients; for instance, Graefe, whose clinical wards had, I believe, at first and for some years, not more than 12 beds. Nervous diseases, chorea, neuralgia, female diseases, and some others, can be studied with great advantage in dispensaries, and this should not be lost sight of by their medical officers.

On the Construction of Dispensaries.

The building in which a dispensary is established ought to serve no other purpose. The ground-floor is used for the dispensing department, the waiting-room for patients, the consulting-rooms, with private examination-rooms built out of them or between them, and there may be a small room for visitors. On the first-floor are two committee-rooms and medical officer's sitting-room; on the second floor, dispenser's and medical officer's bed-room; and on top floor, housekeepers' rooms, who have the use of the basement as well. Patients have a separate street entrance and separate exit, if possible (pp. 93; 97; 111); therefore a corner house is the best.

Dispensing Department

Must be situated in front or at the back of the building, in order that it receive ample light. The drugs are ranged on shelves round the walls, and the poisons separate; cod-liver oil should be kept in slate tanks; the floor to be impervious; and hot and cold water supplied from taps. There should be a contrivance for boiling water on gas; and a table with metal cover in the middle of the room. A sink is in one corner, two small windows open into a dispensing lobby, and rails are in front of them, so that only one patient can pass at a time.

Waiting Room.

It may be built in four different ways. 1. A large single room, without partitions, containing plain deal seats without backs, and a free space is left between male and female patients. 2. The room is divided in two equal parts by a partition 10 feet high running down the middle. 3. The room is divided into many compartments by high-backed seats standing thus: The females sit behind the males. 4. There are two waiting-rooms, one for male, the other for female patients, with different entrance doors. (See page 129).



The latter plan is the best where a great many patients attend at one time ; but of course the most expensive as regards building and warming. No. 3 is the worst. The heating may be effected by hot-water pipes. Where low and plain seats are found, one superintendent can easily overlook the whole.

The waiting-room need not be very light, but occupy that portion of the building in which lighting is most difficult. For ventilation the windows must be properly constructed, and have louvres.

The Consulting Rooms.

They are divided from the waiting-room by lobbies, and are well lighted. Patients enter by one door, and leave by another. The rooms contain a lavatory in a recess of the wall, and cupboards for instruments, case-books, microscope, and cloth-racks. A table is in the centre, a mahogany couch, for examination in horizontal position, at the side ; it should not be so low as usual ; some consulting and other chairs complete the furniture.

The private examination-rooms may be small, or replaced by glazed partitions or high screens.

Management of a Dispensary.

The affairs of a dispensary are managed by a committee. The members, twelve or fifteen in number, are elected annually by the subscribers. The committee meet about every alternate month, and transact business in the usual manner. Some of the members are house visitors. The medical officers are consulting physicians, consulting surgeons, physicians and surgeons, dentist, and resident medical officer. They are appointed by the committee, who follow the advice of their medical officers for the time being. They can leave by giving a short notice. The resident medical officer is appointed for three years, after which time there is a re-election. As a rule he should not be re-elected. The resident officer visits in-patients. He should devote his whole time to the duties of the institution.*

The dispenser is under the special superintendence of the resident medical officer, but has to comply with the orders of the physicians and surgeons. He lives in the dispensary.

The housekeeper attends to her usual duties as regards cleaning and attendance. She applies for anything she wants in the first instance to the resident medical officer. She is engaged by the latter, but dismissed by the committee if there are complaints.

Medical officers attend at regular hours, either a physician and surgeon on the same day, but one earlier than the other, or on

* See Reading Dispensary.

alternate days. They do not keep lists of the patients, but only make memoranda on interesting cases in the case-books. Each of them may have his own case-book.

Patients must behave properly, return thanks when discharged, and comply with such rules as are made regarding the medicines and drugs.

VI.—IN-DOOR RELIEF BY VISITING THE POOR AT THEIR HOMES.

No one has, so far as I know, made this matter a special subject of discussion and scrutiny, although the assistance supplied by visiting the poor is only secondary to that given by hospitals or infirmaries.

Opinions greatly differ as to the manner in which these things should be managed, and it is not uninteresting to compare this metropolis and others in this respect. From what I read, mentioned in police reports or on other occasions in the public papers, and from personal inquiries, I am led to believe that in London the sick poor have more difficulty in getting this kind of assistance than they have elsewhere.

As regards Paris, the visiting service (*service à domicile*) was re-organized in the year 1853. It is in connexion with the Bureaux de Bienfaisance, which are under the general administration. Paris is divided into twenty districts; each has a bureau either at the mairie or at a house selected for the purpose. The mayor (for the time being) is president. There are "adjoints," a secretary, one or two assistant secretaries, one or two sisters of charity, religieuses, and midwives. The total number of medical officers attached to the twenty bureaux is 240. They receive a small salary, and see patients at the bureau, or the maison de secours belonging to it, and visit them at their homes. The sisters generally dispense medicines, they visit the poor as well, and are in some manner a check on the physicians. The sisters supply the poor with necessaries, as wood, milk, wine, &c.

In Berlin a poor-law board exists. The city is divided into thirty-four or thirty-five districts. Each has a committee and a salaried medical officer attached to it. He sees poor patients at his house, and visits them—a district contains about 15,000 or 16,000 inhabitants. The guilds also pay medical men, who have somewhat larger districts, but attend only to male patients. All members of the guilds are bound to pay a small contribution to the sick fund. (See also Policliniques.)

In Vienna the assistance of the sick poor at their homes is under the control of a municipal board (*Armendeputation beim Magistrat*).^{*} The city is divided into the city proper and the suburbs. The city proper has six medical officers, some of the larger suburban districts have two such functionaries. The districts are generally somewhat larger than in Berlin. There is an institution called *Ordinations-Institut* in almost every district, but patients receive there only medical advice and medicines gratis, and are not visited. The visiting officers have, however, less work to do since these institutions were established.

In all the said cities the medical officers make regular reports to the administration.

As regards Italy, I may mention that till recently religious orders not only dispensed medicines for patients, but in some towns monks visited them and supplied physic.

The poor-law medical officers on the continent, as a rule, only prescribe the medicines, which are made up in the city by the chemists, who are paid by and give a discount to the board, or the medicines are dispensed by functionaries paid by the board. A special pauper pharmacopœia usually exists.

In London, the unions are divided into districts, and the medical officers are salaried for giving advice, visiting, and dispensing. Recently some have been appointed who do not dispense medicines. As regards the districts, the greatest inequality prevails. Some contain little more than 1000, others nearly 40,000 inhabitants. There are, however, many districts containing 10,000 or 15,000. Some of the metropolitan dispensaries undertake to visit the sick poor.

It seems that there are several reasons why the number of poor-law medical officers is not adequate to the work of visiting the poor. In the first place, that they lose a great deal of time by attending to the dispensing; secondly, that the distances are great, in consequence of the dwellings covering a larger area than in continental cities, where they have higher houses; thirdly, the pauperism is greater in this metropolis, and the charges for medical attendance comparatively higher, by which circumstance the number of applicants for gratuitous advice increases; lastly, the number of midwives is comparatively small, and comparatively more midwifery cases are attended to by poor-law medical officers than on the continent.

It would be a great advance and improvement, if medical officers

^{*} Oppert, *Medicin. Centralzeitung*, 1857.

had nothing to do with dispensing, the medicines being supplied by the parish.

Moreover, a great evil has arisen, in consequence of the duties being performed by deputies. Some poor-law medical officers keep their appointment for many years, even for life; but it is only in the commencement they work without assistance; in course of time the work gets into the hands of young assistants. By this younger members of the profession are prevented from obtaining an independent position, and those do the work who are not responsible.

APPENDIX.

USEFUL WEIGHTS AND MEASURES.

1 cubic foot of pure water	=	1728 cubic inch. (Eng.) at 60° Fahr.
1 gallon	"	= 0.16 cubic feet.
" "	"	weighs 10 lbs. avoird. at 60° Fahr.
" "	"	= 4.54 litres (French) = 160 ozs. (Eng.)
1 litre	"	= 0.22 gallon.
1 centilitre	"	= 0.002 gallon.
1 gallon	"	= 8 pints = 4 quarts.
1 pint	"	= 20 oz.
1 ounce (avoird.)	"	weighs 437.5 grains.
1 litre	"	= 35.2 oz. (English.)
1 Prussian quart	"	= 2 pints.
1 kilogramme . . .		= 2.20 lbs.
1 decigramme . . .		= 154 grains.
1 gramme		= 15.4 grains.
1 pound avoird. . . .		= 7000 grains.
1 kilometre		= 3280.899 feet English.
1 metre		= 3.28 feet.
1 centimetre		= 0.328 feet.

To convert metres into feet, multiply by 33, and cut off as a decimal one figure to the right. There will be an excess of about 1 foot, correctly 0.955, in the conversion of every 50 metres.

1 English foot . . .	=	1.029 Prussian foot.
1 cubic metre . . .	=	35.31 cubic feet (English.)
1 litre	=	61.027 cubic inches.

PART II.

DESCRIPTION OF HOSPITALS AND INFIRMARIES.

Initial Nomenclature.

Sc. generally means Scullery; N. Nurse; I. Ward; St. Stairs; L. Lift;
D. Door; W. Window; La. Lavatory.

AMERICAN HOSPITALS.

THEY resemble the English institutions as regards construction and administration. Although founded, almost without exception, by private charity, they often receive subsidies from the municipality or government. The management is in the hands of committees, elected every three years by the governors; and the medical officers are generally honorary. The hospitals are general ones, and every disease is admitted; but small weekly payments are usually expected. The wards are warmed and ventilated by open fires, and many modern improvements are found, which are a credit to the well-known ingenuity of Americans (*see* locker-tables).

During the late war 214 temporary hospitals, containing 134,000 beds, were erected in four months' time. The largest contained about 4000 patients, and it is stated that no hospital diseases were prevalent. Some buildings were badly lighted and ventilated, as the pressing necessity did not allow them to make the best arrangements. Most had only one floor, and were built of wood. Magazines and barracks were converted into hospitals, but some new buildings were erected on the pavilion plan. Besides this, floating hospitals on board ship were arranged, to follow the armies on the large rivers.

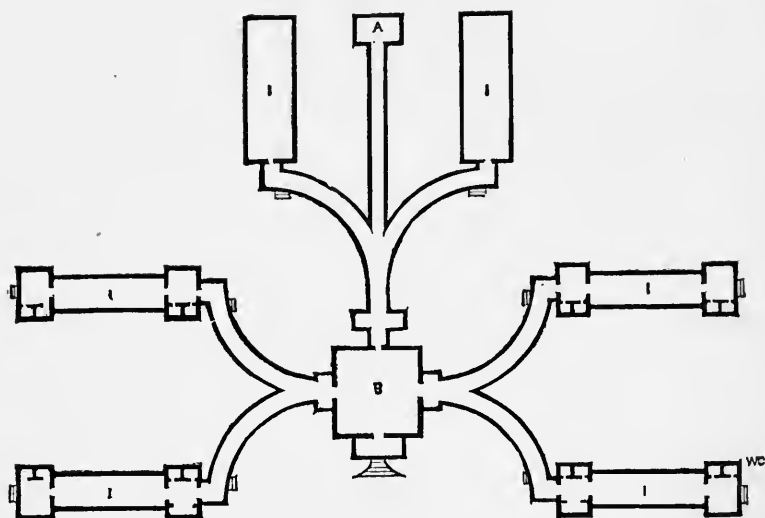
Boston Free Hospital.

This building, recently constructed, is on the pavilion plan, and the connecting corridors have the peculiarity that they form a curved line. The pavilions are only two floors high, and each ward accommodates fifty patients, who receive ample cubic space. The waterclosets and baths are at the outer end, a nurse and separation-room at the other. Small wards are in the block (a), and the administration is located in the centre (b). (*See* next page.)

Hammond Hospital, on the Chesapeake Bay, a military hospital built temporarily during the war.

As seen by the woodcut, a number of separate blocks stand in a

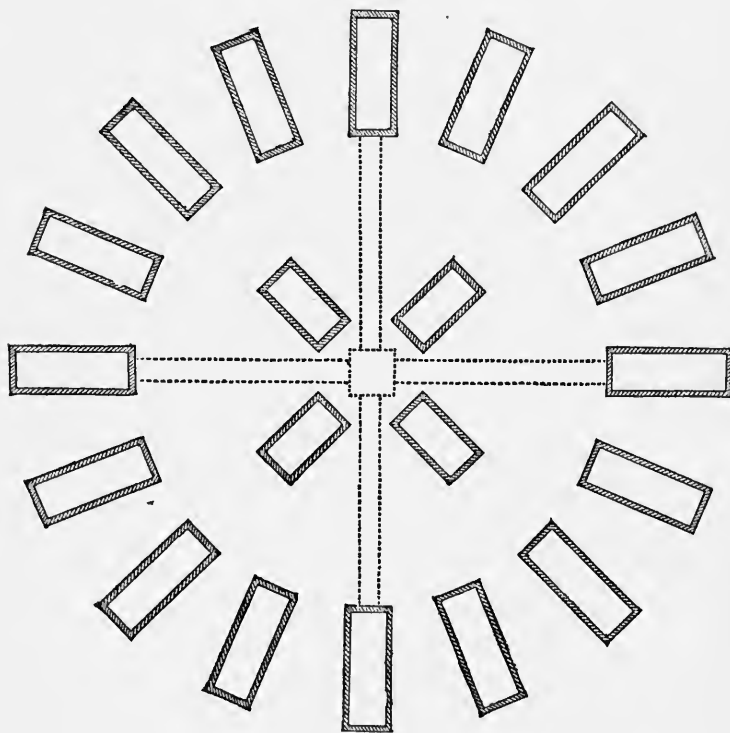
FIG. 3.



Front.

BOSTON FREE HOSPITAL.

FIG. 4.



Front.

HAMMOND HOSPITAL.

circle, and the administrative buildings connected with them by galleries, are in the centre.

New York General Hospital

Consists of three large blocks for 500 patients, and four smaller ones for offices, amphitheatre, museum, engine-room, and wash-house. A medical school and library is connected with it. Many accidents and surgical cases find relief in the hospital, and foreign sailors are received, and pay three dollars a week (or their consuls pay the fee).

Philadelphia Temporary Hospital

Was built on the pavilion plan, the connecting corridors were 14 feet broad, and of considerable height. The blocks, one story high, of wood, contained large wards for forty-eight beds, and smaller ones of different sizes.

I may mention the St. Louis general hospital, which is superintended by a religious order, and the asylum of Pennsylvania, which was opened in 1859, as a refuge for 250 lunatic patients. In its construction it resembles the Vincennes military hospital.

BELGIUM.

The administration of the hospitals, hospices, and the general system of relief to the sick poor in Brussels, is carried on in much the same manner as in Paris. There is a central board (*l'administration générale de l'assistance publique*) and a president (*en chef*), at the head of it. Besides the principal hospital, Brussels has a maternity institution, where midwives are trained, and *bureaux de bienfaisance*. *Réligieuses* and *sœurs de charité* attend to the nursing.

HOSPITAL ST. JEAN, BRUSSELS.

The buildings forming the hospital cover a large piece of elevated ground in the town of Brussels. There are large gardens in front, but the other sides are surrounded by houses.

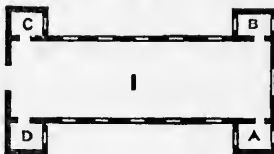
The front buildings surround a square yard. The general administration of all the hospitals and hospices of Brussels, has its offices here; there are also the private rooms of the director, and of the medical officers; the dispensary, library, museum, and baths, patients' clothes-room, porter's lodge, &c., in this part.

Behind it we find the pavilions for the patients—five on the left, and four on the right side; and the amphitheatre in place of the fifth. Separate are the wards for the insane, the dead-, wash-house, engine, and post-mortem room. The pavilions are connected by a gallery on the ground and first floor.

The wards are 92 feet long, have opposite windows: five on each

side, and one at the end—the latter opening on to a balcony. They contain twenty-four beds, two between two windows, having a space of hardly three feet between them; the opposite beds are at a distance of twelve feet. The ceiling is arched about sixteen feet from the floor; the latrines (*a*), and a private room (*b*), are built out at the one end, and the nurses'-rooms (*c*), and a kitchen (*d*), is near the common corridor.

FIG. 5.



PAVILION OF HOSPITAL ST. JEAN, BRUSSELS.

There are calorifères for warming, and eduction channels for foul air, which lead into shafts opening above the roof. Of course this is an unsatisfactory arrangement, because the air often comes back into the wards.

DENMARK.

Copenhagen Hospital

Is an extensive building, which may accommodate 800 patients. It was opened in 1863, and is built on the corridor plan. The main portions stand around a large rectangular yard, and six wings extend side and backwards. The wards are on three floors, and contain 10, 5, and 2 beds; they are warmed by hot air injected by a fan. An asylum for lunatics stands detached in the grounds.

ENGLISH HOSPITALS.

Although in this country some of the charitable institutions owe their origin and existence to the Government, or a board connected with it, yet the greatest number are offsprings of private benevolence, and supported by voluntary contributions. Although the various charities are unconnected with each other, yet the sick poor are generally well cared for, and as the time is not far distant when those institutions which are not in accordance with an advanced age will be improved, English institutions need not fear criticism and comparison with others.

The hospitals are generally managed by committees; the rules and regulations are of great simplicity compared with those of continental establishments, and of great similarity, although made independently of each other. The construction of some buildings—especially in the Black country—shows great architectural ingenuity, and modern improvements are added almost daily.

By means of Samaritan funds, the care bestowed on the patients is extended beyond the period of their stay in the hospitals, and the convalescents, when they leave, are assisted with money grants, as they are unfit for immediate work. The necessity of having more convalescent institutions in the country begins to be fully realized.

That the medical officers of infirmaries supply medicines by contract is not uncommon at present, but boards of guardians and committees already appreciate the advantages of a different system.

Public dispensaries exist in greater number and reach a higher standard of perfection in this than other countries, but the visiting of the poor at their habitations undoubtedly requires improvement.

Bath United Hospital

Is partly an old, partly a new building, in the shape of the letter **T**. The wards lie behind and in front of a transverse corridor, which is heated by hot air.

The hospital contains about 100 patients.

Birmingham Hospitals.

Birmingham General Hospital. It dates from the year 1779, and was originally a building with a centre and two side wings extending backwards; the former is traversed by a central corridor. But lately new wings have been added. The site is unfortunately a bad one, the building lies low and is surrounded by manufactories, but originally it stood in the open country. It contains now about 250 beds, and the new wards are on improved principles. In some wards hot air is used for warming in addition to fireplaces. Ventilators are found in the ceilings, but the principal means of ventilation are the windows.

Queen's Hospital. This is quite a recent building, and accommodates 180 patients; the wards hold mostly 18 beds. They are warmed by open fire-places, and there is no artificial ventilation, but openings for admitting fresh air are found in various places of the wall and ceiling. The windows are kept open even during part of the night.

The feverhouse is a separate building at the back.

Birmingham has moreover an orthopædic, an eye-hospital (50 beds), and one for children (24 beds).

Blackburn Infirmary.

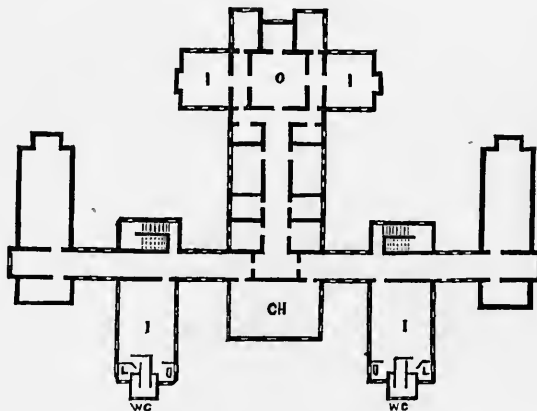
The Blackburn infirmary is situated near Blackburn, a small town 24 miles distant from Manchester. The hospital stands on an elevated piece of ground outside the town near the railroad, and is conspicuous from a great distance. The building is not yet half

finished ; but is intended to form 8 pavilions and a central building. At present it accommodates 40 patients. It is constructed on a mixed plan, half pavilion and half corridor. The passage, which is spacious (nearly 9 feet wide) runs through the centre on both the ground and first floor, having promenades overhead. The pavilions are divided by this corridor into two unequal parts, one about 14 feet and the other 40 feet long. By this arrangement there is a space of 50 feet between the principal wards. The entrance hall is very spacious, and warmed by hot flues, but it is not used ; the hospital is entered by a side-door.

The larger wards for eight patients are very fine. They are lofty, 16 feet high, have opposite sash windows, and the walls coated with Parian cement. The windows extend to about 4 feet below the ceiling, and in the intermediate space are tablets of perforated zinc similar to those in railway carriages. The patients complain of cold, as there are ventilators besides in the ceilings and apertures in and near the flooring.

A cubic space of more than 1800 feet is allotted to each patient. Each has a clothes-box which forms the lower part of a chair and makes it look like a night-stool. Each ward has four fireplaces, two at each end ; the closets are ventilated by open windows and gasburners in a flue. There are a few baths of painted iron, they resemble marble, but the colour does not appear to keep well.

FIG. 6.



Scale— $\frac{1}{84}$ of an inch to a foot.

BLACKBURN INFIRMARY.—FIRST FLOOR.

There are nurses' rooms, lavatories (L), day rooms, foul-linen shafts, lifts, speaking tubes, and a medical library. The necessary private rooms and common dining-rooms are arranged satisfactorily.

There is an operating room (O) in the central part, and small wards near it; the passages leading to them are very narrow. The chapel (CH) is on the other side of the corridor.

The dispensary is light and airy. Out-patients enter by a separate door; but the consulting room has only one door for patients to enter and go out by.

The kitchen is not in a separate building, but in the basement. Dead-house, wash-house, and engine-room are detached.

The infirmary is kept in a perfect state of cleanliness, and in many respects worth a visit by those who may be in the neighbourhood.

Bradford Infirmary.

The rising town of Bradford contains two modern institutions.

The infirmary was completely rebuilt and has now the shape of a letter **H**, the old part forming the centre. It has only recently been completed, although some wards were finished three years ago. It contained at the time of my visit 75 patients, but is destined to accommodate 150. The old part has a very fine corridor 9 feet wide, and the wards on the first and second floors are in front; a few wards are at the back. On the ground-floor we find offices and a fine entrance hall, which is not used, as the entrance is by a side-door.

The end wards on ground and first-floors are very light, lofty, and airy. They contain 23 beds. The walls are plastered, the ceilings whitewashed, and the floors impervious. The windows are sash-windows, and opposite; there are ventilators over the windows and in the ceilings, and louvres over each door. Besides open fireplaces we find hot-water pipes along the middle of the floors; they are covered with perforated plates, and if too much heated have been found to cause an unpleasant smell. They are difficult to clean, because the gratings are fastened to the pipes. The beds have iron foot-boards, which are removable; they in many places stand too close. At the head we see iron frames for bed-pulls.

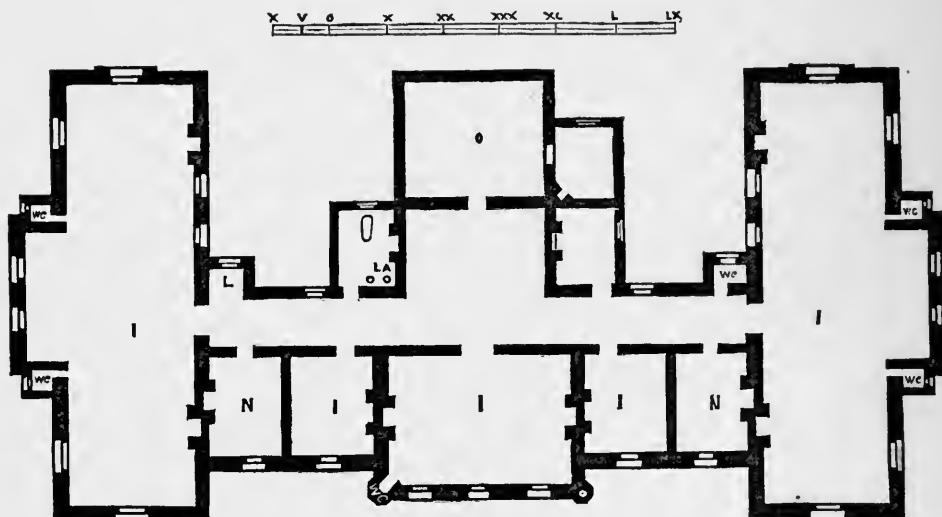
The floors are of deal, and scrubbed.

There is a large and light operating room which receives light from above and through a side window. A patent operating table stands in the middle. There is a spacious kitchen, which has too large a range. Vegetables are boiled by steam.

The baths are of earthenware coated with enamel. The wash-house is separate, and has some modern appliances. The proceeding is as follows: The foul linen is first put in earthenware tubs, standing round the wall, where the stains are rubbed out with soap, soda, and a little ammonia (a patent fluid was tried, but found to spoil the

cloth); the cloth is then partly boiled by letting some steam into the said tubs; when taken out it is subjected to the action of a wheel* turned by a handle, and wrung by passing through wooden rollers. It is then dried and taken to the laundry. Here we find the usual drying ovens and mangling machines. A new dead-house was in course of construction, attached to, but not communicating with the principal building. A nurses' room was to be built over it.

FIG. 7.



Front.

BRADFORD INFIRMARY.—FIRST FLOOR.

The out-patients are seen on the ground-floor; they have a separate entrance, and there are two waiting rooms—one for medical, the other for surgical cases. Male and female patients are *not* separated, but sit together.

The Eye and Ear Infirmary, Bradford.

This institution is of recent origin, was founded by Dr. Bronner (a German), and opened in 1857. It is remarkable by the luxury with which it is furnished, and is well arranged. It only holds eighteen patients, but there is a large number of out-patients.

The plan of construction is that of a corridor hospital on a small scale; a spacious passage (nine feet wide) runs the whole length of

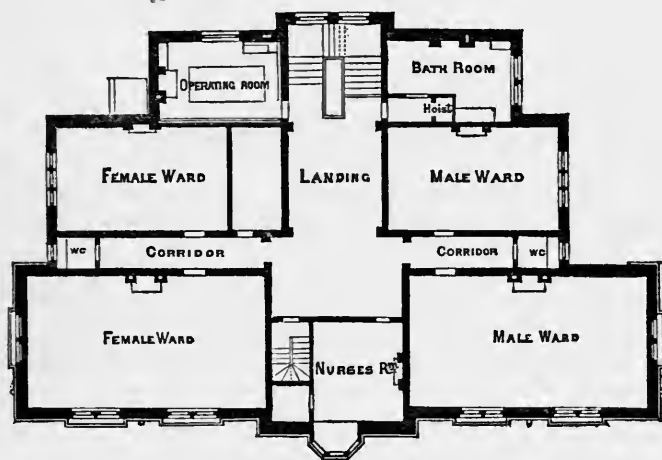
* Bradford's patent washing, wringing, and drying machine. Cathedral Steps, Manchester: 15*l.* 15*s.*

the building. It would have been better to have placed windows instead of waterclosets at the end.

We enter a fine hall, warmed (in winter time) by hot pipes, and leaving the ground-floor for the present, we reach the first floor. Here we find wards for males on one side, and for females on the other. There are four wards, all opening into the corridor.

They afford ample cubic space to each inmate, stated in the report to be 1500 cubic feet; but I consider this a low estimate. The walls are oil-painted of various colours, generally green; the floor is of oak; the windows are on the sash principle, and can be darkened by stuff and Venetian blinds. There are also sliding or hanging shutters, by which all light can be excluded. Each ward has

FIG. 8.



Front.

BRADFORD EYE HOSPITAL.—FIRST FLOOR.

a fireplace and a large comfortable hearth-rug. At the back of the first floor we find the operating-room, which has a large window and skylight at a considerable height. The operating table has Graefe's contrivance for fixing the head between two padded boards, by means of screws, on the principle of a book or card-press.

The baths are of enamelled earthenware.

A large day room is on the ground-floor, used in rotation by male and female patients.

The out-patients' department is completely separate from the hospital. It is on the left of the hall, and has a separate entrance at the back of the building. Out-patients enter the waiting-room from a porch; they sit down on comfortable seats, but the sexes

are not separated: they enter the consulting-room by one door, and leave by another; and pass on to the dispensary before they leave the house. In the consulting-room two medical officers may see patients at one time; a wooden partition about five feet high runs through the middle. Adjoining this room is a dark (eye) room, a cloak-room, and lavatory.

The administration is in the hands of a committee. There is no resident medical officer, but the medical men (four) attached to the institution reside near it. The house is in charge of a matron; patients are admitted by letter, and some make small payments. Patients leave their coats or dress in the cloak-room, and are provided with coats of a dark coloured woollen stuff. They objected at first to this novel arrangement, but are now extremely satisfied, and certainly present a better appearance than they would do in their own dress.

The cost of constructing the building was 5500*l*.

BRISTOL HOSPITALS.

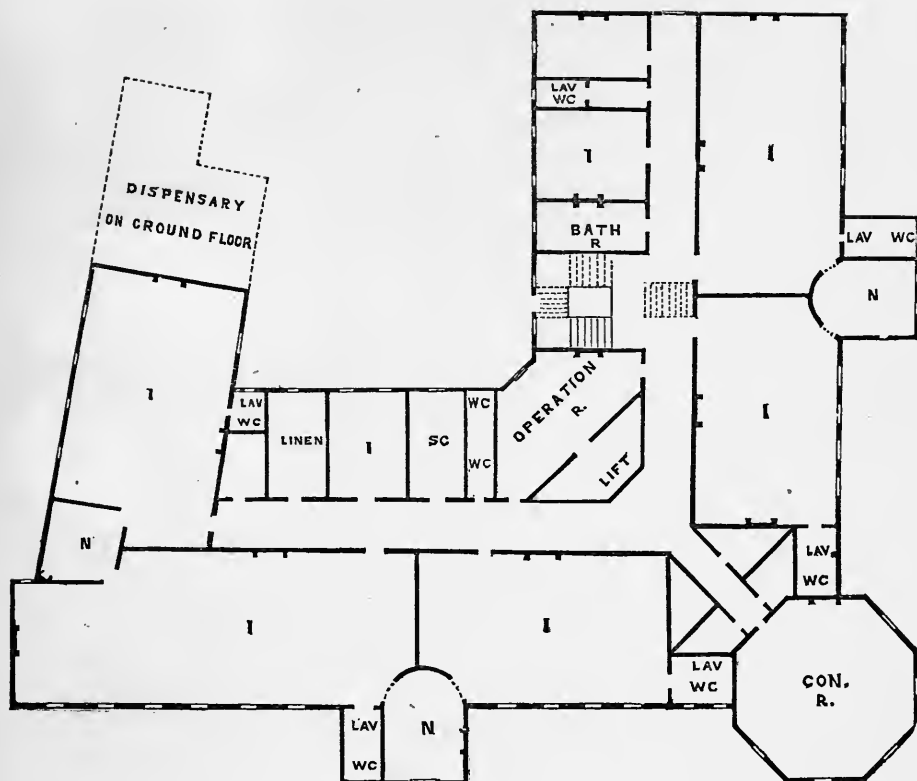
Bristol General Hospital.

It lies on the outskirts of the town, close to the docks. It was opened in 1832, but completely rebuilt (Gingell, architect), and reopened in 1853. It can accommodate about 130 patients; the males being on the first floor, females on the second. There are twelve wards, of which three are small—for two patients only—the larger hold eleven to seventeen each; the cubic feet allowed to each patient about 1100 feet. The wards have stuccoed floors, which look bright and clean, but are said to be cold. They had no fireplaces originally, but were heated by hot air from an air-chamber containing hot pipes; but the medical staff advised the construction of open fireplaces, on account of erysipelas which infected the hospital. Now it is said to be very healthy; the hot air is at present little used for warming the wards. The windows are arched, and sash windows. Twelve cribs for children are placed in the women's wards. Convalescent rooms, lavatories, and waterclosets, are in sufficient number. The hospital is visited by students. (*See plan on opposite page*).

Bristol Royal Infirmary,

Is an old building for 242 beds. It contains large wards for twelve or fifteen beds, and a few smaller ones: two-thirds are usually surgical, and one-third medical cases. The wards are judiciously separated by interposed staircases, corridors, or sculleries and closets, and the passages are very wide and airy. Warming and ventilation by open fireplaces. The hospital is used for medical instruction.

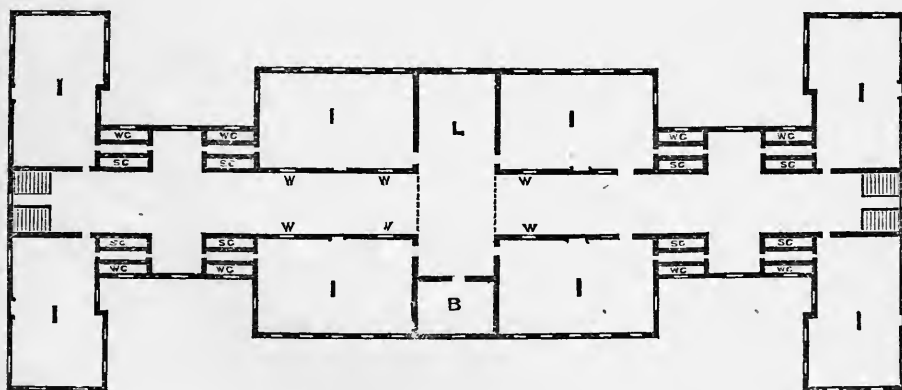
FIG. 9.



Front.

BRISTOL GENERAL HOSPITAL.—SECOND FLOOR.

FIG. 10.



B. Bath, L. Lift.

Front.

W. Window.

BRISTOL ROYAL INFIRMARY.—FIRST FLOOR.

There is an eye hospital in Bristol for eleven beds ; one for women and children (eight beds), and a lying-in institution.

Bury New Hospital.

This has been open only four years ; it is constructed on the pavilion plan ; contains about eighty beds. Two wards on each floor are in a line, but separated by offices, stairs, and lobbies. They have closets and bath-rooms at the further end ; 1500 cubic feet is allowed to each patient ; the walls are coated with Parian cement, the floors of polished oak wood. The out-patients' department appears to be well arranged.

The nurses overlook the wards from a window in their rooms, and nothing is kept in the wards—not even medicines.

Sussex County Hospital (Brighton),

stands on high ground overlooking the sea, containing 155 beds. The wards are of different sizes ; for eight, thirteen, or sixteen patients. They have windows on two or on three sides, and some open into each other ; the cubic space is ample, especially in the fever wards. There are inlets and outlets for ventilation, but they are said to be a failure. The heating is by chimney fires.

There are three physicians and three surgeons, two assistant-physicians, and two assistant-surgeons ; one resident officer, and two resident pupils.

Addenbrooke's Hospital, Cambridge.

The old university town of Cambridge, which boasts of many beautiful and ancient buildings, now possesses a general hospital, which is not unworthy of the other institutions.

In 1719 a hospital was founded in Cambridge by John Addenbrooke, M.D., and it was enlarged in 1814, the funds being supplied by a Cambridge bookbinder. But as it was defective in many respects, the committee saw the necessity of reconstructing it. This was done on a plan first suggested by Dr. Humphry, professor of anatomy, one of the medical officers, and executed by Mr. Digby Wyatt, the architect. The new hospital has now been open about nine months. The site could, of course, not be changed, as part of the old building was left standing. The town of Cambridge lies low, as also the hospital, the country around being flat. The ground is consequently damp ; but the building is surrounded by ample gardens in front and back, and supplied with plenty of good water. The front, although not at all richly ornamented, has a very pleasing appearance, created by open verandahs and terra-cotta facings.

There is a ground and two upper floors over a basement, and projecting parts at the sides and in the centre. A part of the old hospital stands out at the back.

Entering the ground-floor, we find a ward on the left, and the out-patients' department on the right side. The ward is fifty-one feet long, twenty-eight feet six inches wide, and about sixteen feet high; it contains eighteen beds.

On the right side is a waiting-hall of irregular shape, to which out-patients have access by a special door. They have no separate exit, but leave by the same door.

In this hall, which is warmed by a double fireplace and hot pipes, seats are placed for the patients, and two dispensing windows open into it. Adjoining we find consulting-rooms; they are well lighted, and look comfortable. Attached to them is an operating-room.

Ascending the broad stone staircase, we come to the first floor. Here we find in the centre a male convalescent room just over the front entrance. At one side is a large female ward; at the other a male one. These wards are seventy-nine feet long, twenty-eight feet nine inches wide, and eighteen feet high, affording 1800 cubic feet to each patient; there is a nurses' room and scullery at one end near the stairs, and waterclosets and lavatories at the further end. The latter are built out of the main building. The wards receive light through large opposite windows, five on each side; they reach near to the ceiling, and the top compartments revolve inwards. The lower ones are sash-windows.

The walls are oil-painted, two colours: the principal one is green, but the lower part of the walls near the floor is of a reddish brown tint. I was informed that the committee could not incur the expense for Parian cement, which would have been 4000%. In some places I observed that the colour was blotchy, and was informed that the walls were painted before they had time to dry. As related above, the site is rather damp, and therefore it is expected that for some time it will be found difficult to keep the walls in good repair. Notwithstanding this, the wards had a most cheerful, and even imposing, appearance. The bath-rooms are heated by hot pipes, and so are the corridors; there are some Roman baths with coloured tile floors, where the temperature can be brought to 140 degrees. They have as yet not been used.

These large wards are heated by three fireplaces, one of small dimensions at the outer end, and two back to back in the middle of the ward, but a little nearer the stairs. The most noteworthy arrangement is that the smoke-pipes are contained in hollow columns

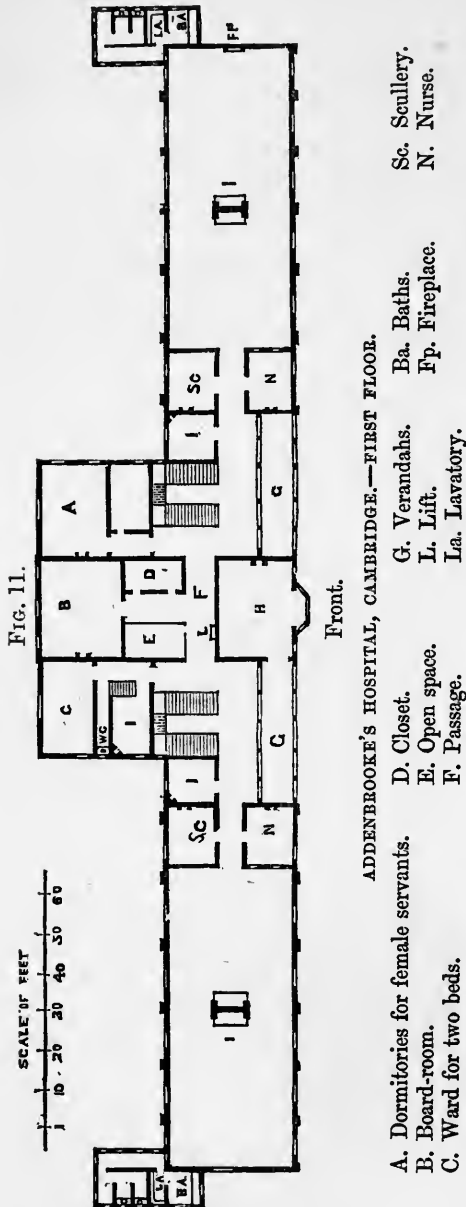
of terra-cotta, four in number, which seem to support the ceiling,

and standing a few feet distant from each other, they do not interfere with superintendence or ventilation. As they are of terra-cotta (with ornamental top) they throw out some of the heat which passes through them.

The only means of ventilation are the doors, windows, and fires; and as the cubic space is ample and the hospital rarely full, it will be possible to keep the air sweet if attention is given to the subject. It is intended to prevent by some means the patients from being able to shut the windows whenever they like.

The floors of the wards are of deal, and scrubbed, but the flooring of one is lacquered as an experiment. On the second floor there are several small separation rooms.

In the old part two or three fever wards are on the first floor; they are not so lofty, and the windows are less high than those in the new building: they were not in use when I visited them. The waterclosets are in the projecting portions of the building. These wards have a separate entrance. Underneath are consulting-rooms and the dispensary; the latter is well lighted.



A good large drying-room is attached to this part of the building; the wash-house is in the basement of the front building; it is small

and of little importance, as the patients have their washing done outside the hospital.

The kitchen, which has been made higher than it was formerly, is in the basement of the front part, and gas and open fires are used for cooking.

The dead-house is quite separate. The verandahs are used by the patients as promenades; they afford a good view of the surrounding country.

The hospital is in connexion with the university; it can accommodate 115 patients; it has trained nurses from St. Thomas's Hospital. There are two physicians, three surgeons, and one house-surgeon, who attend to the in and out patients. Admission is by governors' letters.

The hospital is remarkable as a happy instance of transforming an old and defective building into a new and handsome structure, which may reasonably be expected to fulfil its principal object.

The cost of reconstruction was only 14,000*l*.

The Cumberland Infirmary, Carlisle.

A small hospital for 50 beds. The rooms or wards lie on two floors on each side of a transverse corridor, and have consequently windows on one side only. The lower corridor is heated by hot pipes, and the warm air ascends hence into the upper one. There are four medical officers attached to the institution. Admission is by letter; paupers and domestic servants are received on payment of twelve shillings per week.

Cheltenham Hospital,

Built in horse-shoe form (1849), having a centre and two wings; it contains 92 beds, which never are all occupied. A corridor runs through the centre, and the wards are mostly in front of it. They are well lighted by large windows, some are warmed by hot-water pipes, and the corridors by hot air. There are four ventilating shafts. Closets and baths are in good condition.

Chester Infirmary

Is within the town, but with gardens in front and behind; it is three stories high. The ground-floor is used for offices; the patients (less than 100) are in the first and second floors. The buildings form a square around a court, the corridors being inside. There are seven wards on the lower and nine on the upper floor, of irregular shape, and some badly constructed; but in most of them a sufficient cubic space is afforded to the patients. There are two female lock, and separate

fever-wards. A house-surgeon and porter lately died of fever, caught, most likely, in the fever-wards. Some patients pay one shilling a day.

Chorlton Union Infirmary.

The seemingly bold undertaking of having a workhouse infirmary constructed on modern hospital principles has led to a very good result, which invites further imitation; and it must really be a great satisfaction to the board of guardians who were the promoters of it, to have proved that not all the boards resist obstinately the requirements of an advanced age.

Although I may point out a few minor defects, yet I think that a glance at the plan of the building, and a few remarks, will leave no doubt in the mind of the reader that the institution in question is worthy of much praise.

The site is a good one: the building stands in the open country at a moderate distance, about six miles from Manchester, and one mile from Whittington. It is built on the pavilion plan. There are five blocks, standing 100 feet from each other, four of them completed, connected by a gallery.* Each pavilion has three floors, containing a large ward for 30 patients, and a side-ward. The waterclosets and baths are at one end, and the nurses' room, scullery, hoist, and stairs at the other end. The wards are 124 feet by 24, and 14 or 15 feet high. The nurse overlooks the ward from a window. The windows are opposite, eight on each side, and three end windows. They have two sash compartments and a top part which is pivoted. A small portion of the upper part is provided with a passage for air the whole width of the window, but guarded by wire-gauze. The windows extend to within a few inches below the ceiling.

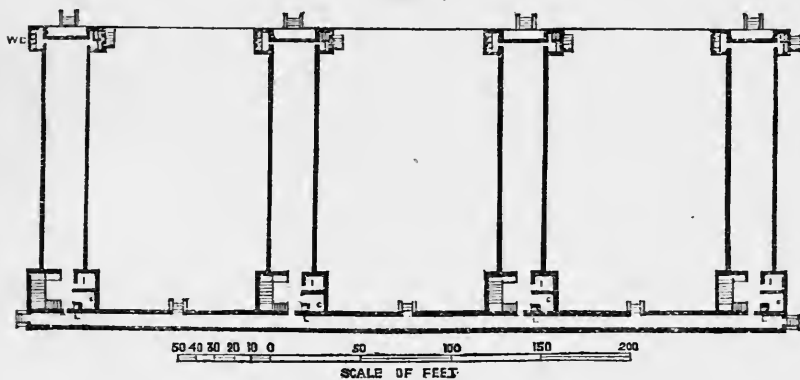
The walls are only whitewashed (not plastered), and this might possibly be altered at a future time; the floors are deal. There are three large fireplaces for warming, five feet wide and four feet six inches high, projecting three feet into the ward, in order to keep off the heat from the nearest bed. They are not of an ornamental character.

The patients have a cubic space of between 1300 and 1400 feet; but there are very efficient means for ventilation—so much so, that the inmates complain of cold, and, as I was informed, sometimes catch cold. There is a draught from the top of the windows straight down to the beds; this might be altered. The beds stand too near the windows and wall. There are eduction channels for foul air

* This is as yet open at the sides, but will be, I was informed, closed by glass, and partly serve for day-rooms.

into the flues, and trap-doors in the ceilings, and gratings in the floor for admitting fresh air.

FIG. 12.



Front.

CHORLTON UNION INFIRMARY.

I. Nurse.

C. Scullery.

L. Lift.

The staircase is airy, of stone and iron; the waterclosets have no seats, but only circular and removable rings. They are self-acting by a weight being lifted when the door is opened. There are gas-burners in the wards of simple construction, and the products of combustion educted by a tube through which the gas-pipe ascends. The iron bedsteads are strongly made; they have head and foot boards.

The kitchen of the infirmary lies between it and a large dining-hall, which latter adjoins the workhouse. Both kitchen and dining-hall are light and lofty. As regards the workhouse, I take leave to mention that I was surprised to find the beds in an old women's bed-room that I entered, standing scarcely a foot distant from each other. As the male and female day-rooms are generally crowded during day-time, the cubic space of air which an inmate enjoys must be limited.

With respect to the infirmary, it contrasts most favourably with those institutions which have been the origin of so much public censure.

Middlesex County Lunatic Asylum, Colney Hatch.

This institution is one of the largest of the kind, and contained at the time of my visit about 800 male and 1400 female inmates. It occupies a large space of ground, which, including all the land attached to it, covers 138 acres. It is seven miles distant from

London by the Great Northern Railway, and was considerably enlarged in 1858.

The buildings stand around rectangular courts, which are eight in number, if those are excluded which are open on one or two sides. They generally contain three stories over a basement; others have but one story. From the outside, the windows, which are narrow and of the Gothic style, have no characteristic appearance. A large chapel is in the centre; the stairs are of stone and iron. The rooms occupied by the patients are dormitories and day-rooms. The latter are, in fact, the corridors into which the former open. The dormitories are either common ones for a large number, or single ones. The largest of the kind contained more than 150 beds (on the male side), and the surface area for each patient appeared hardly sufficient, to judge by the spaces left between the beds. The single rooms are 9 feet by 6, and of moderate height, affording generally a space of about 800 cubic feet. The windows are placed high in the walls. All the bedsteads are of iron covered with sacking, with woollen and horse-hair mattresses. They are folded up every morning, and the beds made every evening. There is a good supply of bedside carpets.

The day-rooms have windows on one side only. The upper part of each opens, but not in the proper manner; this, however, will be improved. Some of the windows have stained paper let in between each pane to make them look cheerful. The walls are covered with prints; the ceilings, which are mostly arched, are painted in blue and white. The day-rooms are also used as dining-rooms. The knives have blunt edges, with the exception of a cutting space two inches long, and the forks are strong enough for the purpose, but would double up if used for violence. The plates are common earthenware, and there are tin mugs for beer. The patients sit down at long tables covered with white cloths.

There are self-acting waterclosets, lavatories, with plugs, taps, and slate slabs, and bath-rooms to each day-room. A Turkish bath is in a separate building. I saw enamelled zinc, copper, and glazed earthenware baths; the latter are preferred. The rooms are warmed by open fires, and in some cases by hot air, which has passed over hot-water pipes. Perforated zinc plates are occasionally let into the walls near the flooring, and there are a few ventilators near the ceiling. For ventilating the dormitories small zinc plates are used, and small apertures near the ceiling; they are not sufficient. Each day-ward has a scullery and padded-room attached to it. The latter rooms are differently arranged; in some cases the walls are padded all round to a height of six or seven feet; or one

wall near the door is left uncovered, and others have the floor padded. A mattress is sometimes substituted for the padded floor. The padding consists of cocoa-nut fibre covered by canvas, which is painted a light colour. The doors are double or padded. In the latter case they are shut, without having a lock as usual, but a small board fitting against the wall and turning on hinges. A small shutter is in the door, and an eye-hole becomes visible when the shutter is raised. There is one padded room to about a hundred patients. The rooms were untenanted at the time of my visit.

These rooms have no waterclosets, but metal night-vessels, which can be taken out from the corridor. In the older portions of the building they form the lower part of the door; latterly, they are arranged at the side of the door. They have no cover. Opposite the door there is a very small window.

A book-shelf, scantily provided with books, is found in the projecting parts of the day-rooms. Curtains and blinds are not numerous. I observed with pleasure bagatelle-boards and aviaries. With respect to plants and flowers, I was informed that the time of the year did not allow them to be displayed.

Looking out of the window, I saw some of the worst cases taking exercise, which is here preferred to seclusion. The patients appeared to conduct themselves properly. The air, with the exception of that in a few wards, was tolerably sweet.

The attendants have their rooms close to or between the wards. There are, of course, additional attendants to the wards with refractory patients. Filling the windows for overlooking the wards with perforated zinc, instead of glazing them, is an improvement.

A lecture-room and a theatre are attached to the institution, and a lecture on Australia was to be given the same evening. Other entertainments, as dancing, singing, and music, serve to cheer the patients.

The patients wear a woollen dress, generally of grey colour; the striped ticking was given up on the recommendation of the Commissioners of Lunacy. No strait waistcoat is found in the hospital. Convalescent patients are employed in the shops as tailors, boot-makers, painters, upholsterers, &c.; the women assist in making dresses, sheets, towels, &c.; also in the airing-grounds, farm, bake-house, wash-house, kitchen-garden, and other work of the kind.

The kitchen is very large; open fires are not much used. Gas is employed for cooking pies, puddings, and small joints of meat. Vegetables are boiled by steam.

The laundry is very extensive. The linen is partially washed, and is then placed in a large dolling machine, where it is walked,

There are larger wringing and mangling machines than I have seen elsewhere.

Travellers, a kind of carriage to take the washing to the drying-stoves, are much in use. Powerful engines are employed for all the proceedings.

A farm is attached to the establishment, and under the care of a steward.

There is an infirmary separate from the lunatic wards.

Management.—The establishment is under the management of a committee; the patients are sent and paid for by the different parishes in the county of Middlesex. Two medical superintendents live within the walls; one for the females, and the other for the males. Each has an assistant. There is an apothecary and his assistant, and between 140 and 150 officials, including an inspector, steward, and matron; a chaplain visits the wards. All these functionaries have to make annual reports to the committee.

The Commissioners in Lunacy pay regular visits to the institution, and propose improvements to the committee. Their suggestions are generally acted upon, and it is likely that many improvements now needed will be introduced in course of time.

Derbyshire General Infirmary,

Founded in 1810; it can hold 150 patients, including fever and lock patients. The principal feature is a fine and large central hall which extends from the ground to the roof, and has a skylight. Round this hall a number of small wards are grouped on three floors; the waterclosets are "squeezed into most objectionable nooks,"* and badly ventilated.

Parts of the building are warmed and ventilated by artificial means. There is a high air-tower at some distance from the building; from this a tunnel leads to a hot-air chamber in the basement of the hospital, where hot pipes lie in coils. The heated air ascends hence to the attic wards, where it is admitted through large gratings, but there are hot pipes running round the ward in addition. The vitiated air finds its way out by air shafts, and ventilators in the ceilings. Some wards have open fireplaces.

The beds have curtains, the mattresses are filled with oat husks. Some of the patients are admitted on payment of small weekly sums, others by letter.

The fever-house is of more modern construction; the wards are lofty, and well ventilated; the larger ones (for five beds) have windows on each side.

* See Bristowe and Holmes.

The Devon and Exeter Hospital,

In the cathedral town of Exeter, for about 230 patients, consists of an old and new part ; the latter is a wing containing three floors over a basement. On each floor are two large parallel wards for 30 patients, divided by a spinal wall, in which are several large windows. One ward is 80 feet long, the other only 70, by a nurse-room being cut off. They are 20 feet wide and 15 feet high, affording ample cubic space to each patient. The windows open on an incline.

There are open fireplaces and hot-air flues. The extraction of vitiated air is effected by air-channels, which communicate with a ventilating tower. Smoke-flues open into it, and it also contains the hot-water reservoir. The closets are separated by lobbies from the wards. The building has lifts, lavatories, sculleries, bath-rooms, hot and cold water service, &c., and is much praised as a country hospital on improved principles.

The Essex and Colchester General Hospital

Stands near the London Road, in large grounds of its own ; it has two floors and seven sick wards, four of which are for 20 patients ; 90 can be accommodated. The walls are whitewashed, the floors can be scrubbed ; the closets are in sufficient number and good condition. Corridors and wards are heated by open fireplaces, and there is no system of ventilation.

Surrey County Hospital, Guildford.

It was founded *in memoriam* of the late lamented Prince Consort, E. W. Lower, architect, and opened in July, 1866. It is situated outside the town ; can accommodate 52 patients, and is built and fitted up on the most improved principles. The buildings stand on two acres of land.

On the ground-floor are the rooms appropriated to the resident medical officer, matron, and porter ; store, linen, board, and secretary's rooms ; and in the east wing are house visitors' room, surgery, dispensary, dressers' room, and waiting rooms for out-patients, adjoining which are bath-rooms and waterclosets. In the rear portion of the building are the kitchen, scullery, larder, bread room, servants' room, &c. &c. The front centre portion of the main building is carried up and down one story more than the rest of the building ; the lower portion of which serves as wine, beer, and coal cellars and pump-room, in which latter is the disinfecting closet or oven ; and in the topmost story are large and airy bed-rooms.

The lift extends from the basement floor to the one-pair. Over

are fitted with a range of Jennings' patent lift-up basins. The baths are of porcelain by Rufford & Finch. The lobbies to the patients' waterclosets are fitted with small stoves, but these are used only in cold weather; they are ventilated at the level of the ceiling. The windows in the wards are all glazed with plate glass, and the wards are warmed by open fires, which are also made to ventilate the wards by drawing off the foul air at the level of the ceiling. The operating room is lighted by three windows and a large skylight, and hot and cold water is also laid on to this room. The wash-house is fitted up with washing trays and the patent machinery of Mr. Bradford, whilst up-stairs are drying-rooms. This building stands in the north-west corner of the ground, and the dead-house in the north-east corner. All the rain-water from the roofs is saved in a large tank capable of containing many thousand gallons. The grounds are tastefully laid out, and planted with trees, shrubs, &c.

As Guildford has no sewers, the hospital has a cesspool. The drains are ventilated by carrying pipes up to the tops of the chimneys.

Herbert Hospital, Woolwich.

This is a military hospital. It is situated on an elevated piece of ground nearly two miles from the town of Woolwich, on the Dover Road. It is built on the pavilion plan, and has an unpretending outside, but embodies almost all modern improvements. It is intended to accommodate more than 600 patients, but contained only 320 at the time of my visit. Some of the wards are not yet finished. There are four double and three single pavilions, standing at a distance of 65 feet from each other, all connected by a passage on the ground-floor. The administration department is separate, and the kitchen, library, and common bath-rooms are in the portions projecting from the corridor in the centre. The passages are 12 feet wide, and are paved with coloured tiles.

The pavilions, except that for administration, contain two floors over a basement, the first-named building three. All staircases are of stone, with iron balustrades. The wards are large, for 28 or 32 beds; they have opposite sash and large end windows; the latter contain a ventilating louvre. The walls are covered with white cement, the floor is beeswaxed and polished, the ceilings are only 14 feet from the floor. About 1250 feet of cubic space is allotted to each patient. The wards are warmed by two large stoves in the centre. They contain moveable grates and open fires. The quantity of fuel consumed per day is only 80 pounds of coals. The smoke flues run under the floors. Fresh air passes from the floor through the stoves, and is admitted into the wards through perforated plates at the top.

The patients, when asked, did not complain of cold. There are several means for ventilation besides the windows. For admitting fresh air we see an iron pipe running in the floor, underneath the windows; it is warmed by the flues from the stoves, and has perforations by which air can enter. There are apertures near the ceiling, which can be closed by drawing a balance-weight suspended before the windows. Some of the valves, however, did not act properly. The said apertures serve for admitting fresh air from an air shaft leading to the roof. The apertures placed in the corners of the ward lead into the flues, and are intended for drawing out the foul air.

FIG. 14.



DOUBLE PAVILION
OF THE HERBERT
HOSPITAL, WOOL-
WICH.—FIRST
FLOOR.

- B. Bath.
- C. Corridor.
- L. Lift.
- N. Nurse.
- T. Ward.

The nurses' room is near the entrance, and has a window for overlooking the ward. The scullery opposite is of narrow dimensions.

The bath-rooms at the further end of the wards contain a bath of earthenware, and are separated by slate partitions from the other part of the room. The waterclosets are on the syphon principle, the urinals self-acting; the lavatories have slate slabs and plugs. The bath-rooms and lobbies to the waterclosets are warmed by hot-water pipes. The common bath-rooms contain, besides the ordinary ones, vapour and douche baths.

In the centre and in the basement is the kitchen, which is rather low. In the middle, standing free, is a remarkable rectangular range of great dimensions, where all the smoke flues lead downwards. Close by is another long range for boiling by steam.

A fine large library is at the disposal of the convalescents, where they read and lounge. They also use the open terraces in fine weather.

The chapel overhead is spacious, and has an arched wooden ceiling. The windows contain coloured glass, the centre parts of which open by levers.

The dispensary, being in the basement, is not light enough.

The water cisterns are of galvanized iron. The water is obtained from a reservoir at Shooter's Hill, supplied by a well in the neighbourhood. It is raised to the principal cistern by steam-power, and passes through charcoal filters. Some of it is softened before it is distributed to the different parts

of the hospital. The water pipes in the house were frozen in the cold weather as elsewhere.

Of useful implements, I have to mention plain bed trays made of deal, with two side parts joined to the principal one by hinges, bed-warmers of metal to be filled with hot water, trays for the tin dishes, having double bottoms for hot water, and earthenware bed-pans. As improvements I may mention the hot closets in the scullery for warming and airing linen for the patients; the foul linen and dust shoots of earthenware, which open by doors on the passage, one shoot serving for both purposes, although the upper openings are separate; and the letter-box for patients in the convalescent-room.

The drains are properly laid, and are ventilated by the vertical drain pipes, which carry off the foul smell, being open at the top; they are stated to have, moreover, charcoal filters placed in zinc gratings at the top; but of this I am not certain.

The wash-house for the hospital and the gentlemen cadets' establishment is at a short distance on the opposite side.

Huddersfield Infirmary,

A hospital for about 40 patients, contains old wards, which are small and badly constructed, and a large new ward, which has opposite windows, and affords ample cubic space. It is heated by hot-water pipes, and has inlets for air, and ventilating tubes in the ceiling to draw out the vitiated air, but they are said to frequently become inlets. The waterclosets are well placed at some distance from the wards; the drainage is good; it goes into an old coal-pit, through which a constant stream of water runs.

Ipswich and East Suffolk Hospital,

A building two stories high, for 42 patients, 16 medical and 24 surgical; it contains large wards for 10 beds, and smaller ones for two. They afford, when full, very inadequate accommodation and cubic space. There is no artificial system of warming and ventilation. Ventilators are placed in walls and ceilings; they are but of little use. The closets are in good condition, the floors scrubbed, the walls whitewashed. The out-patients' department affords relief to a considerable number of patients.

Hull General Infirmary.

This hospital can accommodate 150 patients. It is built on the corridor plan. The principal building is three stories high, with one wing on the left. The corridor runs through the whole length of

the main block, and the wards in front and behind; there are some projecting portions. The wards contain 8 or 10 beds, and when full afford only from 700—1100 cubic feet to a patient. The windows are sash-windows, but have transverse plates of perforated zinc at the top in front of the upper sash. There are open fireplaces, and ventilators in the ceiling or upper part of the wall. Some wards have window-spaces opening into the corridor, and two communicate with the chapel by a window.

The medical staff consists of two physicians, three surgeons, one house-surgeon, and a dispenser.

Kent and Canterbury Hospital

Stands in the country in a favourable position, but is deficient in construction. The building consists of one block, 150 feet long, 50 deep, and containing eight wards for 120 patients, on two floors. The wards are for 6, 8, and 13 patients; they do not afford sufficient cubic space, and mostly open into each other, as there are no corridors.

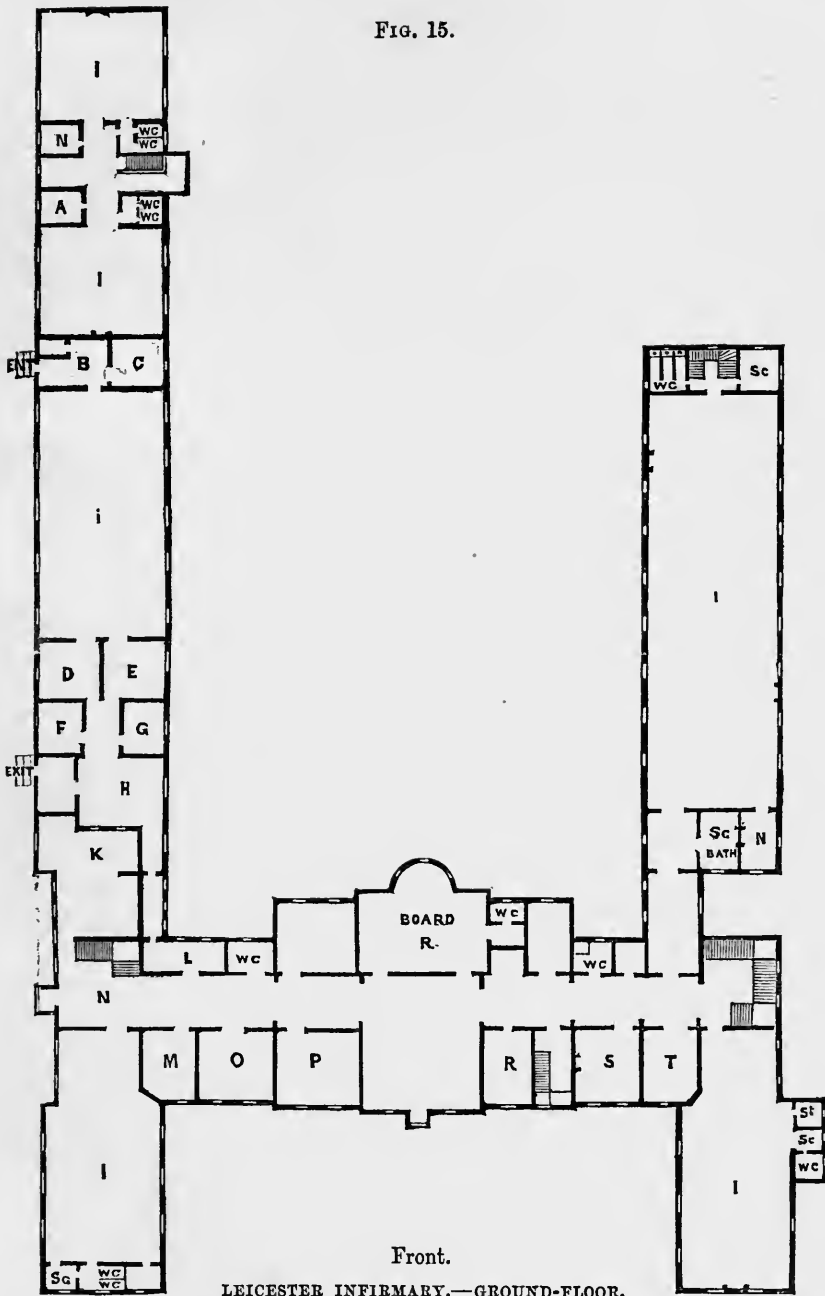
Leicester Infirmary.

In the small town of Leicester I was surprised to find a large infirmary for 200 patients, well constructed and arranged. The building stands at the outskirts of the town, but the houses begin to surround it; as yet the open country is at the back. Only the central part, and what projects from it in front, is the old part of the building; the wings (of different lengths) were opened four years ago.

The older part has a fine hall, warmed by hot air, but not used, as the entrance is from the side. A fine corridor, 11 feet wide, larger than I have seen anywhere, runs through the centre; it is warmed by steam. This part contains offices and private rooms, and some wards. The principal and larger wards are in the new wings. There are three of them, each having room for 30 patients. They have opposite sash-windows, the top part inclining inwards, and always open throughout the wards; there are also perforated zinc plates over the windows, but they are pasted over with paper. The slides, too, by which air could be admitted near the floor, are not used. A few Arnott's valves are near the flues, but they have become rusty. There are only two fireplaces in these large wards, which in very cold weather are hardly sufficient to warm them.

The walls are coated with Parian cement, the floors of deal; the waterclosets are well ventilated, and with the sculleries are at one end, the nurses' room and baths of enamelled earthenware being at the other.

FIG. 15.



- | | | |
|--------------------------------------|----------------------------------|--------------------------|
| A. Baths and lavatories. | F. G. Private examination rooms. | N. Nurse. |
| B. Out-patients (W. C. at the left). | H. Dispensary waiting-room. | O. Pupils' sitting-room. |
| C. Porter. | I. Waiting-hall. | P. Library. |
| D. Physicians' room. | K. Dispensary. | R. Matron. |
| E. Surgeons' room. | M. Surgery. | S. Dining-room. |
| | | T. Stores. |

Large and airy day-rooms are on the upper floor. The nurses' sleeping-rooms, in the attic of the centre part, are removed as far as possible from the patients. Large ventilating lanterns are at the top of the staircase. The kitchen is in the basement. Meat is stewed and vegetables are boiled by steam; there are also large tin boxes in which plates are carried to the lift.

We find also a medical library and a small patients' library, an engine-room, where one fire heats the water, and steam-boiler; and a fine operating-room, with patent table and a glass case for the instruments.

LEEDS HOSPITALS.

New Infirmary, Leeds.

I saw it in an unfinished state. It is built on the Lariboisière plan; there are five pavilions. The wards are large and fine, but there are too many wooden beams across the ceiling; the floors are impervious, and covered with oak planks, which are to be polished.

The walls are plastered and faced with Keene's cement; there are opposite and fine end windows. All the windows have iron frames; they are on the French principle in the offices and private dwelling-rooms, and of a mixed style in the wards; they generally open like doors, or tilt inwards.

Two large patent stoves (they cost 30*l.* each) stand in the centre of the large wards; they have descending flues, and fresh air enters from the floor to become heated and ascend to the ceiling. The corridors are heated by hot-water pipes, which run free near the ceiling.

The waterclosets are on Jennings' principle; they have only small windows opening like doors for ventilation, and one ventilator in the wall.

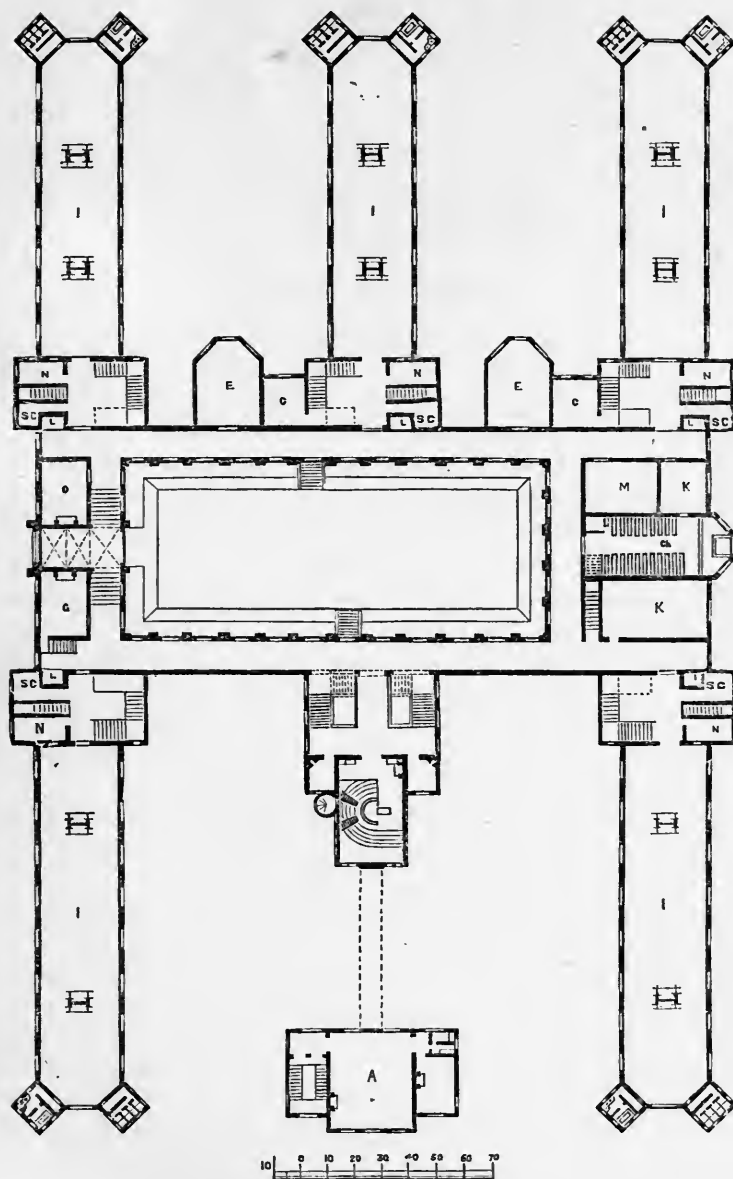
The lavatories have tilt-up basins, and are on Jennings' principle, with slate slabs.

The baths near the wards are of enamelled earthenware, and there is a common bath-room with vapour baths and douche.

As regards ventilation, there are air-trunks for admitting fresh air, and for this purpose are the trap-doors, seen in the ceilings. There are also a few apertures in the floor and over the windows, corresponding to the round ornamental openings in the walls.

There is scarcely any hospital in this country more worthy of a visit than the New Leeds Infirmary, even though there are as yet no patients in it, and it is impossible at present to judge how the means for ventilation will answer.

FIG. 16.



Front.

NEW INFIRMARY, LEEDS.—FIRST FLOOR.

A. Board-room.

K. Bath-rooms.

M. Vestry.

E. Day-rooms.

Ch. Chapel.

L. Lift.

G. Separation-room.

Old Infirmary, Leeds.

This hospital is an old building. It consists of a main portion and two side wings extending backwards. The former is built on the corridor plan. We find wards in front of the passage, and other wards in portions projecting at the back of the corridor. The wings contain wards with opposite windows.

The principal defect of the hospital is its overcrowding, but this will be removed as soon as the new one can be used. Other defects have been removed. The ventilation is improved by openings cut in the walls, and some low ceilings have been carried higher, also louvres have been placed over doors.

The out-patients' department is badly arranged, as the patients sit together in the hall.

Leeds has a special hospital for diseases of women and children. It contains about fifteen beds.

There is a fever hospital called house of recovery. It lies in a very poor district, at some distance from the centre of the town, but not in an open locality, many factories being near. It can accommodate about 80 patients. It is built on the corridor plan, and contains numerous chambers for one or two patients, but no larger wards. There were hardly any patients in the hospital at the time of my visit; but when it is full great difficulty must be found in nursing and superintending the patients.

There is a dispensary for diseases of the eye, where a few in-patients can be accommodated.

LIVERPOOL HOSPITALS.

Liverpool Southern Hospital

Lies close to the river, opposite Birkenhead. It can accommodate about 120 patients, and is built on the corridor plan. The corridor runs the whole length of the building, and has wards in front and back; it is very lofty, and can be ventilated by large windows which may be opened simultaneously.

The system of heating on the south side is partly by hot air, partly by open fireplaces; and in the north wards both hot air and open fires are used. The hot air is admitted through gratings in the floor close to the gratings for cold fresh air. The ventilation is by extracting the foul air by means of a fire on the top floor of the building.

Liverpool Northern Hospital.

This is a hospital for about 130 beds, very badly situated in a noisy part of the town, near two railway stations and a soda manu-

factory, built on low ground, and surrounded by a densely populated and low neighbourhood, near the river Mersey. It receives almost exclusively surgical cases.

It is built on the corridor plan, containing fifteen wards on three floors; some of them are small and irregular. They are heated by fire-places, and occasionally by hot air. No less than seventeen nurses are in the hospital—four head-nurses, nine assistants, and four night-nurses.

Liverpool Royal Infirmary

Is an old institution, situated in the centre of the town, built in the horse-shoe form; it contains about 160 patients, the greater part surgical cases. A system of ventilation for which an air-tower was constructed, did not answer, and was given up; the air-shaft is now used as a clock-tower. Chimney fires and open windows are the principal means for ventilating the wards; there are outlets for foul air, but they are nearly useless.

A lunatic asylum is in connexion with the hospital.

Liverpool Fever Hospital.

It was erected in Brownlow workhouse, and opened in 1864. It has the shape of the letter **T**, and consists of four floors, each containing two wards for 20 beds, so that 160 patients can be accommodated. The wards are 64 feet long, 24 wide, and have opposite windows, seven on each side. The cubic space allotted to each patient is said to be about 1100 feet, which would not be sufficient. The means for ventilation are—first, two fireplaces, one at each end of the wards; there are also ventilators close to the beds about a foot lower than the patient, and ventilators on a level with the ceiling, eight in number, to educt the foul air into the smoke-shaft. The waterclosets are at one end of the ward, the nurses' day-room at the other; but the nurses sleep at some distance. The matron's residence and the medical officers' rooms are in a separate building. The wash-house is also detached.

Liverpool has, moreover, an eye and ear infirmary for 34 beds; a hospital for cancer and kindred diseases; one for children, containing 20 beds; and a lying-in hospital for 30 beds.

LONDON HOSPITALS.

a. General Hospitals.

The general hospitals are—with the exception of the London and St. George's hospitals—situated in densely populated localities and surrounded by houses. They are three or four stories high; they

generally are warmed by open fires which are burning all the year round, and ventilated by sash-windows, doors, and openings in the ceilings or walls. The windows are kept partly open not only during day-time, but also at night; not to such an extent, however, as would be concluded from some descriptions. Usually one upper sash is lowered a little, so that some air can enter. The wards are large, cubic space ample, floors generally of deal and scrubbed (*See*, however, King's College, children's ward). The bedsteads are of iron and low, without foot-board; curtains are rare. The exterior is less grand than that of most continental hospitals; surgical cases outweigh the medical ones, and the results of operations are (in some of them at least) more satisfactory than in many cities on the continent.

The out-patients' departments afford relief to a comparatively greater number of cases than in other countries; celebrated schools are connected with the hospitals; libraries, museums, and laboratories also exist.

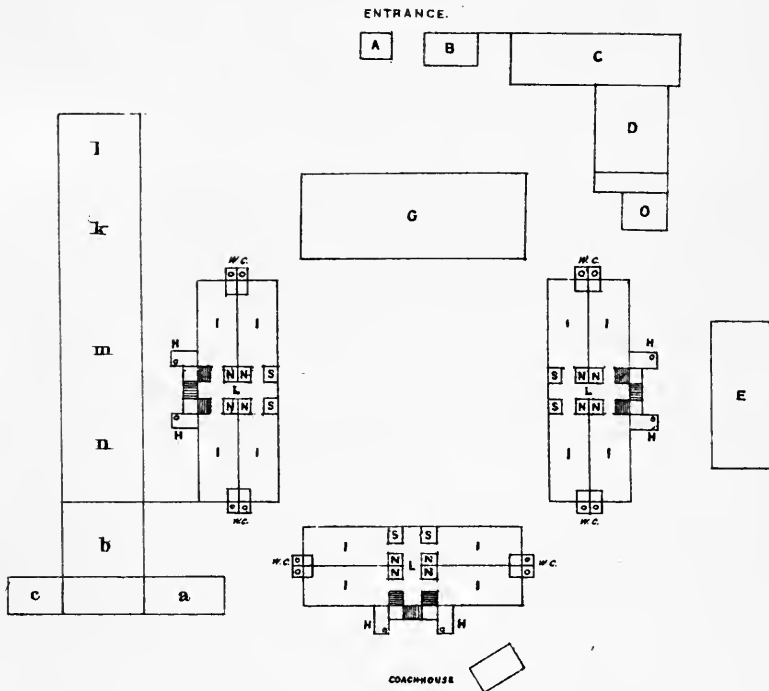
The number of special hospitals has increased lately to an astonishing extent.

Bartholomew's Hospital.

This charity was founded in the year 1102, for the suffering poor of every description except small-pox patients. It was rebuilt in 1730, and is the most ancient hospital building in the metropolis. There is accommodation for about 650 patients. The hospital consists of separate buildings, which are unconnected with each other and occupy a large piece of ground in a central part of the City. The four principal blocks stand round a square yard and are of equal dimensions. That one which is nearest the entrance serves for administrative purposes, the others contain wards. Each block has from 13 to 15 windows in front and 4 at the ends; each block is intersected in the centre and from top to bottom by a large and airy staircase with old-fashioned wooden banisters. There are four floors; each contains a double ward with a partition wall; the latter is open at one end only. All the wards have opposite sash-windows, large louvres over the door, open fires in the centre; and the beds stand at a considerable distance from each other, so the cubic space for the patients is ample. Fresh air is admitted by keeping doors and windows open, and through the louvre over the entrance door; the windows on the staircase are rarely closed.

There are lock-wards in the attics; they afford much less cubic space to the patients, as the ceiling is low and the outside wall sloping. In fact, they would be unfit for acute cases. The water-closets are well placed, built out of the main building and not

Fig. 17.



BARTHOLOMEWS' HOSPITAL.

- | | |
|--------------------------|--------------------------|
| A. Porter! | G. Administration! |
| B. Chapel. | I. Wards |
| C. Outpatients & Surgery | H. Bath, W.C., Scullery. |
| D. Surgical Wards | M. Nurse! |
| E. College | S. Sister! |
| O. Operating Room! | L. Landing! |
| a. Waiting Room! | I. Library |
| b. Dispensary | K. Amphitheatre! |
| c. Laboratory | M. Museum! |
| n. Postmortem Rooms. | |

entered directly from the wards. Baths and sculleries are placed in a similar manner in the projecting portions ; and sisters' and nurses' rooms are in the centre.

We find a fifth building at the back of the left-hand block. It contains two large surgical wards, a separation and consulting room ; adjoining is a lofty operating theatre.

Another separate building is called the college, and serves as a residence for pupils and medical officers.

The ancient chapel or church is near the entrance, and a little to the left is a building which contains large waiting-rooms for out-patients (who are admitted here without letters), and the surgery.

The dispensary adjoins the right-hand block at the further end. It is a one-storied building and has waiting-rooms for males and females. They are warmed by fire and hot pipes. A laboratory was in course of construction at the time of my visit.

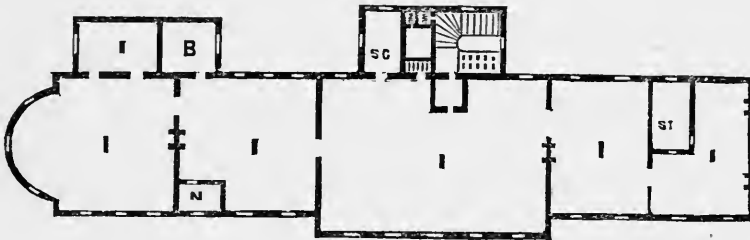
Museum, amphitheatre, library, and post-mortem rooms, form one row of buildings at the back of the right-hand block. Beyond stands a coach-house.

Bartholomew's Hospital is one of the few where admission is free without letter, and the medical officers frequently select cases from the numerous out-patients.

Charing-Cross Hospital

Is situated in a densely populated district, closely surrounded by houses. It consists of a single block, containing three floors over a basement and attics. There are 118 beds ; the wards are generally

FIG. 18.



FRONT:

CHARING-CROSS HOSPITAL.—FIRST FLOOR.

B. Bath.

Sc. Scullery.

St. Stairs.

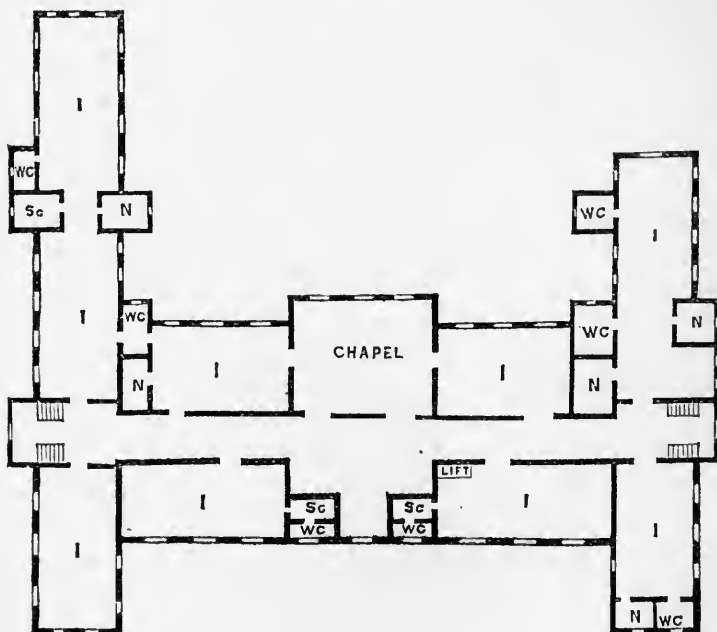
small; the largest can hold 15 patients. The females are on the first, males on the second, and children on the attic floor. A few

side-wards for two or three beds are on the first and second floors at the back. The cubic space allotted to each patient is very variable, and not everywhere sufficient. The principal fault of construction originated in the want of space; all the wards on one floor open into each other. It was most likely in consequence of this, that typhus spread in the hospital three years ago: a female was admitted into a ward contrary to the rules, and the disease was caught by a nurse and several patients in quick succession, so that the medical officers advised the clearance of the hospital. The out-patients' department is on the ground-floor; 12 nurses live on the premises; 9 medical officers are attached to it, including the house-surgeon. A convalescent institution for 60 or 70 patients at the sea-side has lately been connected with the hospital.

St. George's Hospital.

It was founded in 1733 outside the town, and completely rebuilt and re-opened in 1834. It is now, although on one side in close

FIG. 19.



Front.

ST. GEORGE'S HOSPITAL.—FIRST FLOOR.

proximity to other buildings, more favourably situated than the rest of the metropolitan hospitals, as it faces the parks on two sides. It

resembles the shape of the letter **H** ; one wing is, however, more extended than the other. There is room for 345 beds. The hospital contains 32 wards, if we count the double ones as two. The cubic space is said to be about 1200 feet. The windows are mostly sash-windows, but some are formed by three compartments, each revolving inwards. The new wards have opposite windows.

In addition to fireplaces we find stoves in some wards heated by hot pipes from the basement. There is an air-shaft, and Arnott's valves are placed near the ceilings ; they are not of much use.

Lifts are used for raising food, and also patients ; they are raised in their beds to the second floor. Children are admitted into the general wards.

The waterclosets are self-acting. There is a telegraph in the hall, used for announcing the arrival of the medical officers. Convalescent wards are a recent addition, and the roof is used as a promenade.

The dispensary and baths are in the basement, which is low ; the kitchen is there also, but it is somewhat higher than the other rooms. The patients have the use of a small library.

Guy's Hospital.

This hospital was founded in 1722, by Thomas Guy, and additions have been built subsequently. It is situated near the London Bridge railway terminus, a short distance from the river Thames. It stands in ample grounds of its own (7 acres), but is surrounded by a busy neighbourhood. Originally it was intended for little more than 300 patients, but can accommodate now 580 (including eye-patients). The oldest part is that which abuts upon the entrance. A rectangular building open in front forms the entrance court ; two square yards are behind it, surrounded by similar blocks of buildings ; the centre part dividing the yards from each other has an open colonnade on the ground-floor. Galleries running along the first floor are now in course of construction.* The wings of the building stretching out in front serve for administration purposes, but the blocks surrounding the yards are—with the exception of that portion occupied by the library and a few offices—used for the patients. The wards have windows on each side, and stretch round the corners, so that they are generally composed of two rectangular rooms joined in a rectangle.† The windows are mostly sash-windows ; those looking into the yard on the ground-floor are placed rather high from the floor. Many windows have a middle pane in the

* January, 1867 ; a new amphitheatre, too, is built on the second floor.

† See Fig. 1 No. 3.

upper part opening inwards, and by this means fresh air is admitted day and night. In addition there are louvres over the doors for ventilation, and ventilators in the ceiling. The attic wards (for syphilitic patients) are rather low, but ample cubic space (nearly 1800 feet) is afforded to the patients. In the next yard is found a singularly shaped building, which is one floor high. It contains to the left of the entrance door a ward, with five windows on each side, for 10 or 12 patients; the corresponding part on the right contains private rooms, and others which are used for microscopical and chemical investigations. There are two oblong clinical wards for medical cases; they offer some peculiarities.* They have six or seven sash-windows on each side, with wire blinds, and a triple bow window at the further end. Beyond the ceiling does not form one level, but is composed of a lower and higher portion; the latter forms the centre, and is supported where it joins the former by iron columns. As it is lighted by windows at the sides, the wards receive ample light. In the centre nearer to the entrance are two fireplaces back to back, with a somewhat unsightly ascending flue. The waterclosets are entered from the wards. Rooms for the nurses and bath rooms are conveniently arranged in the centre.

The male clinical ward contains 17 beds, the female one 18. In the building to the left, which is two stories high, we find on the ground-floor a ward for males, and adjoining it an operating room. On the first floor is a ward for females; this ward has five windows on one side, at a considerable distance from the floor, and another window opposite the door; there are green curtains to darken the room.

In the block to the right of the clinical wards, and which is three floors high, the ground-floor is used for domestic purposes—ironing, nursing, sleeping rooms, and a separation room. On the first floor is a surgical ward for ten males, and on the second floor a ward for ten females, with five cribs.

The new block is an imposing building, four stories high; the out-patients' department is on the ground-floor, and the upper floors contain wards. Here are the often-mentioned double wards (*salles accouplées*), divided by a spinal wall; with a break over the fireplace, and at each end. There are six windows on each side. Between each two wards a day and dining room is interposed, and a nurses' room, scullery, and closet.

The patients enjoy in all the wards the extraordinary cubic space of about 2000 feet; these are only for medical cases. The principal ventilation is at present by the windows and doors, and the spacious

* See Fig. 1 No. 7.

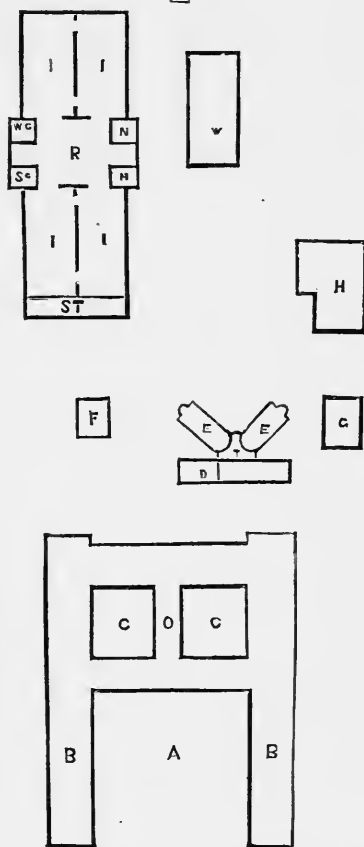
staircase. The door leading from it into the yard is always open, except on very cold days, and the windows on the stairs are also kept open. Communication between this reservoir for fresh air and the wards is effected by large louvres and open cuttings in the walls.

Originally an artificial system of warming and ventilation (in addition to fireplaces) was in action, and for this purpose the two towers were constructed; the higher one for drawing off the foul air. The fresh air, heated in winter-time by hot pipes in the basement, was intended to enter near the ceiling, and the foul air to be extracted through channels running near the floor; they communicated with the smoke-shaft, which received additional warmth from hot-water pipes. The system was a failure. The fresh air became so impeded in the intricate passages, heated by flues, that it did not enter the wards in any perceptible amount; the extractive power was energetic enough, and the costs moderate; about twenty-nine shillings annually per bed and patient.

The wash-house is worth a visit. We find a large room, about fifty feet long by thirty-eight, and twenty feet high, with large skylights. Round the walls are troughs and boilers, with large basins near them. A large wheel turned by machinery is in the centre, for subjecting the cloth to the action of hot water and soap. Steam-power is used for a drying wheel. Adjoining the

FIG. 20.

□ P



GUY'S HOSPITAL.—GROUND PLAN.

- A. Entrance yard.
- B. Administration, private rooms.
- C. Court.
- O. Open arcade.
- D. Ward.
- E. Clinical ward.
- F. Ophthalmic ward.
- G. Surgical cases and cribs.
- H. Wash-house, engine.
- W. Museum, post-mortem, lecture-rooms.
- I. I. Double wards in the new block.
- R. Day-room.
- St. Stairs.
- N. Nurse.

large room is a smaller one to store the linen, &c., and a large mangling-room, where steam is used for the machinery. The whole is lighted by numerous gas-burners, when requisite, and being in close proximity to the engine-room has the steam directly from it.

The last block on the right-hand side contains the museum, amphitheatre, and post-mortem rooms.

There are usually little more than 500 patients in Guy's Hospital. Admission is free, with the usual exception as regards small-pox. The medical school includes midwifery, but the cases are treated as out-patients only.

King's College Hospital.

The architect who had to supply the plan for this building was hampered by the want of space, and, considering the circumstances, showed great ingenuity.

The hospital is situated in a poor neighbourhood, at the back of the Royal College of Surgeons. It is built on the corridor plan, round two square yards of limited dimensions, and a staircase into which a third yard is transformed. The first part was opened 1855, the other portion in 1861; and at present about 150 patients can be accommodated. There are four floors over a basement, and attics over the northern and western parts of the house; they are used for sleeping apartments for the nurses. The ground-floor is used for offices and an accident ward; the kitchen is in the basement.

The staircase is on the left-hand side of the building, and is entered by a corridor. It is of imposing dimensions (44 feet broad, 31 feet wide, and 63 feet high), and lighted by twenty-four windows (six on each floor). The stairs are of stone, the balustrade of iron. The wards do not open into the staircase, but into the corridors and lobbies adjoining it. Most of the wards are of considerable dimensions; some 70 feet by 24; others 85 by 85. They have spinal walls open at one corner, and with small top-windows. There are no small side wards. The walls are lined with Parian cement, the ceilings whitewashed, the floors of plain pinewood (except the children's and lying-in ward in the third story, where the floor is oiled and lacquered). The wards have windows on one side, and some of them a single window at the end. The windows consist of three compartments, the top one revolving inwards, the lower being sash; or all can be opened inwards. The cubic space allotted to patients is 1800 feet; in some wards even more. The wards are heated by one or two fireplaces of moderate dimensions; the waterclosets are mostly self-acting. Two large lifts are close to the staircase; they are raised by water power. In the upper part is a ward for midwifery cases,

containing ten beds; the cubic space afforded to each patient is very considerable.

The patients are attended by lady sisters, who live in the house (the western part), and day and night nurses. The out-patients' department is in the eastern part, and partly built out of the main building. The consulting rooms are numerous, but small, and somewhat dark. The large waiting-room is in the basement, to which there can be no objection. It is approached by iron stairs.

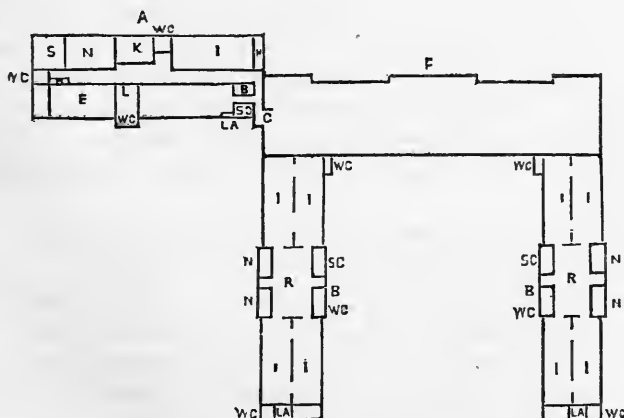
As for the construction of the building, it has been praised as much as it has been condemned. I do not recommend it for imitation. As regards the staircase, it might be improved by taking off part of the ceiling, and replacing it by a moveable skylight. The air is close in the upper part of the stairs, and the nurses' sleeping rooms, approached by a small side staircase from the main staircase, must be unhealthy. The wards might be brought into more direct communication with the stairs by cutting out parts of the intervening walls. The plot of ground in front looks very plain, and, although small, should be embellished a little.

There is serious danger in a hospital like this from hospital disease or fever spreading, if imported or generated in the house, because there are no separation wards.

The London Hospital

Lies in the Mile-end Road, in a densely populated district, where

FIG. 21.



LONDON HOSPITAL.—SECOND FLOOR.

- | | | | |
|--------------------|---------------|---------------------------------|------------------|
| A. Alexandra wing. | La. Lavatory. | L. Lift. | H. Linen stores. |
| B. Bath. | R. Day-room. | K. Hebrew kitchen. | |
| F. Front. | Sc. Scullery. | E. and I. Hebrew wards in Alex- | |
| I. Ward. | C. Corridor. | andra wing. | S. Sister. |

casualties happen continually. Of all metropolitan institutions the London Hospital receives the largest number of surgical cases. The building has the form of a square open at one side, but a new arm (Alexandra wing) has been lately added. There are three floors over a basement; through the front building runs a central corridor, which is heated by hot-water pipes. In front of it, on the ground and first floors, are various-sized rooms, such as consulting, secretary's, private, and committee rooms, and the chapel. Two large wards lie at the back of this corridor.

The two old wings contain large wards, divided in two by spinal walls. In the centre we find a day-room, and at both sides of it nurses' rooms, sculleries, bath, and waterclosets; lavatories, stairs, and additional waterclosets, are at the further end. The wards are warmed by open fires surrounded by air-chambers, and have circular ventilators in the ceilings.

The Alexandra Wing of the London Hospital

Is a block attached to the old building, and communicating with it. It contains three floors, a basement, and attics; the latter are used for the sleeping rooms of the nurses. The longest side has eleven windows, including one triple window; the shortest side has three windows, or two on the ground-floor, and a portico between them. The latter is not used, as the Alexandra wing is entered by a corridor from the old part. On each floor a central corridor runs the whole length of the building. It is lighted by a window at the east end, but there is no corresponding window at the other end by which it might be ventilated; but we find in its place rooms for nurses, private rooms, or a watercloset. There is a stone staircase in the centre, with iron balustrades. It is well lighted at the top by skylights, but badly on the ground and first floors. The walls of the corridor have a lower border, and facings of white polished gypsum.

The wards are on the ground and two upper floors. They accommodate about seventy patients.

There is one ward on the ground-floor facing the yard; it is a children's ward, for twenty-five beds (at the time of my visit there were twenty-six cribs in the ward, standing rather close). The nurses' room and scullery are partitioned off at one end; the watercloset (not self-acting) is at the other. It is built out at the side of the ward, oil-painted, and well ventilated by a large window. The other waterclosets are well placed and ventilated, except that one which blocks up the corridor (on the second floor), where a window should be. In front of the corridor are the nurses' and private

rooms facing the road. On the first floor are two wards, and on the second floor three; one Jewish ward for seven beds (females) in front, and one Jewish ward for nine beds (males) at the back of the corridor. There is also another male ward for fourteen patients.

The wards are only of moderate height, twelve or thirteen feet, and, as in the old building, have windows on one side only. These are sash-windows. There are fireplaces for warming, and large circular ventilators in the ceilings; they communicate with the air-tower, which has louvres at its top, and admits the fresh air, which is expected to enter the wards and to spread gradually near the ceiling, the disc under the circular opening preventing an immediate draught downwards; the foul air to escape by the windows. I did not find any foul smells at my visits, because the doors were kept open. The bath-room and scullery are partitioned off at one end of the ward, or the bath-room is at the side; the lavatories (which, however, did not act), are generally in the sculleries. The most objectionable part is the bath-rooms; they are dark and badly ventilated. They receive a dim light only through the glazed partitions, and have no window. They have one gas-burner, but this is not lighted during the daytime. The steam from the hot bath cannot find its way out by any aperture but the door, and comes into the adjoining ward. This might even now be altered by cutting a slanting opening in the wall.

The beds have mats of cocoanut fibre, paillasses, and mattresses; the latter are mostly of horsehair. Some beds have curtains; most of them are without. The wards, corridors, and closets, are kept scrupulously clean.

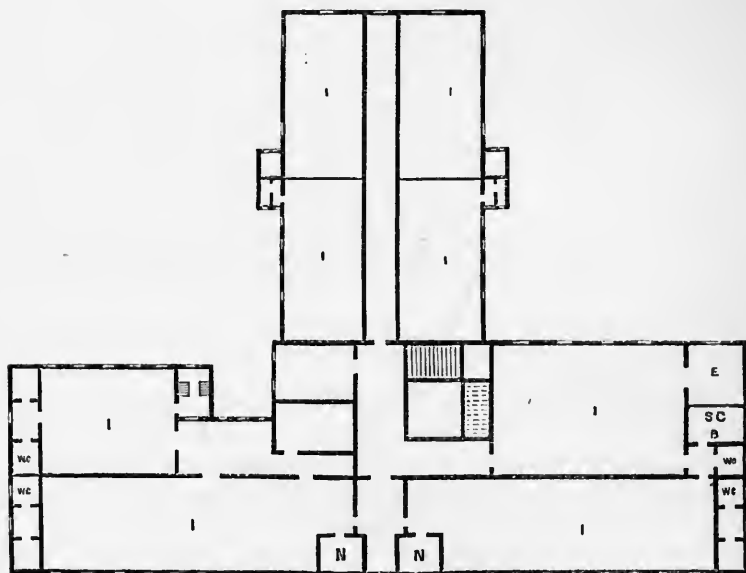
St. Mary's Hospital, Paddington,

Was opened in 1851, and contains now 150 beds—60 for medical, 79 for surgical, 5 for ophthalmic cases, and 8 for diseases peculiar to women; but a new wing is in course of construction, by which it will be possible to receive more than 200 in-patients. The building has the shape of the letter **T**, and is constructed on the corridor plan; but some of the wards open into other wards, and are not connected with a corridor. The front part has, besides the basement, a ground-floor, entresol, and two upper floors; the entresol is used for nurses' sleeping-rooms, which is a very objectionable arrangement, and will cease to exist as soon as the dormitories for nurses in the new wing are finished. Although I did not enter these nurses' sleeping-rooms, I judge from the height of the lower rooms that they are very deficient in height, and they have only small windows on one side.

The ground-floor contains a central corridor dividing it through its whole length, and on each side of it various offices and private rooms, also one or two consulting rooms. The kitchen, engine-room, nurses' dining-room, dispensary, and out-patients' waiting-room, are all in the basement, which is somewhat dark.

In the centre of the building is a beautiful hall and staircase. The stairs, which are of stone, with iron railings, lead to the upper floors, and receive light from above through a glass cupola. In the centre of the latter is a patent ventilator of perforated zinc; but I should think it would be an improvement if some of the windows could be opened by ropes. On the first and second floors we find the principal wards, the accident ward excepted, which is on the ground-floor, but was closed at the time of my visit, on account of repairs. It is, however, the only ward which has opposite windows; all the others have them on one side only.

FIG. 22.



Front.

ST. MARY'S HOSPITAL.—FIRST FLOOR.

The advantage of having a spacious staircase is in some manner counterbalanced by the small size of the entrance-doors and the intervening lobbies. These doors are about seven feet high and three wide, and could certainly even now be made larger. Any one who enters the wards is at once struck by the height of them, which

is no less than 21 feet, that being more than is found anywhere in London, or on the continent except in Italy and the hospital St. Louis. In consequence of it the patients have a cubic space of 1600 or 1700 feet; but they benefit less by it, as the impure air always keeps near the ground, and ascends only by slow degrees to the ceiling.

The construction of the windows is of interest: they are about nine feet high in the old part, being five feet from the floor, and are double, having a space of nearly half a foot between them. The lower part of the outer window revolves inwards, and so does the top part of the inner windows; by these means the outer air can ascend between the windows and enter the ward at the top. Some of the inner windows open like doors. There are ordinary sash-windows found besides, and those of the accident ward have four compartments, all revolving inwards.

The wards are principally warmed by open fires; but besides, the outside air is admitted, which becomes heated before it enters the wards by passing over coils of hot pipes. For ventilating we find apertures in the walls near the ceiling; they are the ends of education channels, which take the foul air to a ventilating furnace at the top of the stairs. This furnace, however, does not seem to act efficiently, although a fire is kept day and night, in which, I was informed, not only coal, but also rubbish from the wards, is burnt. In some wards there are large square apertures in the walls opposite the windows or doors.

Some of the smaller wards are only about 14 feet high, and entered from the back stairs. The waterclosets are self-acting, and well placed.

The new part will contain three floors; the wards are on both sides of a central corridor; they will be about 16 feet high, and the windows extend nearer to the floor than in the old part; their height will be nearly 12 feet. The floors are of iron and concrete; the corridor is five and a half feet wide, and has a large end window. Waterclosets and sculleries are built out at the sides, and apertures are left in the wall opposite the windows.

Middlesex Hospital

Is situated in Charles-street, Tottenham-court Road, and contains nearly 300 beds. It resembles exactly the shape of the letter **H**; the central portion is used for offices and private rooms, medical officers, apothecary, &c., with the exception of the top ward, where cancer patients are accommodated. There are eight wards in each wing; the largest contain 20 beds, and are situated in front; the wards in the back wings are separated from those in the front by

landings and lobbies. The height of the wards is moderate. A sisters' and bath-room is partitioned off the landing. The wards have opposite windows, with the top compartments generally inclining inwards; they are retained in an inclined position by small ledges fixed to the frame-work. In various places perforated zinc plates are inserted in the walls on a level with the ceilings. They correspond to similar ones in the outer wall, which admit fresh air. There are square apertures in the ceilings of the top wards communicating with the space beneath the roof, and louvres are over the entrance-doors.

A lift of moderate dimensions is in the eastern wing; the stairs are of stone, and have iron balustrades; the central corridors, although wide enough, are rather dark, and might be improved by cutting apertures in the walls, separating them from the private rooms, and these apertures might be filled with semi-transparent glass.

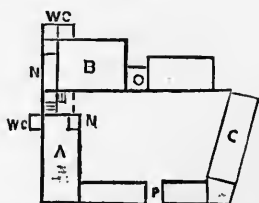
The nurses live in a separate house connected with the hospital by a passage. Sixteen physicians and surgeons attend to the patients (in-door and out-door), including two house-surgeons. There are also two dentists.

This hospital is one of the few in London that can boast of a garden where the patients take exercise.

Royal Free Hospital.

The hospital, founded in 1828 by a medical man, is situated in a densely populated and poor district in the north of the metropolis.

FIG. 23.



ROYAL FREE HOSPITAL.—
GROUND-FLOOR.

- A, B. Wards.
- C. Out-patients' dept.
- P. Porter.
- O. Operation-room.
- N. Nurse.

It is as yet unfinished for want of funds. The principal part, containing the wards, has the shape of the letter **L**; there are three floors over a high basement. Two wards are found on each floor, having a common staircase of stone. But some of the wards in the smaller but deeper block (B) are divided through their length by partitions. All the wards have a considerable height, 16 or 17 feet, and opposite windows. The windows looking into the yard are larger and higher than those opposite; they are four and a half feet from the floor; some have three compartments, of which one or two incline inwards, others are common

sash-windows. The windows opposite are seven feet from the floor, and some open inwards.

The walls and ceilings are whitewashed, the floors scrubbed. At one end of the ward, near the stairs, is the nurses' room and scullery; but the nurses' room is only an incomplete partition, seven or eight feet high, formed partly by curtains drawn across, and partly of wood. The waterclosets are self-acting, well placed, and free from smells.

The wards hold 23 or 24 beds, some of them standing close together; and two wards are generally kept empty, or nearly so, for transferring patients. There are two special lock-wards; in one ward I found medical and surgical cases together, but on opposite sides.

Curtains can be drawn across the wards between the beds; and on the second floor there are even permanent low wooden partitions between each two beds, forming boxes which can be closed in front by curtains. Why these untidy, unsightly, and in some places ragged and soiled, curtains and partitions, which interfere with cleanliness and ventilation, are allowed to remain, I cannot understand.

We find two fireplaces at the opposite ends of the wards for warming them; and, in addition to the windows, apertures in the wall facing the yard for admitting fresh air. There are baths attached to the wards, and I saw one of white glazed cement, imitating marble, which had a very good appearance; but there was no means of warming the bath-room.

The out-patients' department is separate, in a one-floored building, and males and females have different waiting-rooms. The hospital contained about one hundred patients at the time of my visit. It is capable of much improvement, as the original plan of construction was a good one. If the walls were painted like those of Addenbrooke's Hospital, they would at once attain a cheerful and pleasing aspect.

St. Thomas's Hospital.

The old building opposite Guy's Hospital had to be given up, as the ground was wanted for certain railway improvements, and a temporary hospital on the south of the Thames is occupied at present by the patients till the new one is ready for their use. The temporary building contains large wards for about 80 patients, and can altogether accommodate about 300.

The new building will occupy a site opposite the Houses of Parliament, Westminster, close to the river. It will consist of twelve pavilions, surrounding a square yard; they will be connected by a corridor, not on the ground-floor only, but also on the first floor. These pavilions will contain large wards for 28 patients, and smaller

side wards with the usual appendages. Most of the blocks will be four stories high. The cost is estimated at 360,000*l*.

University College Hospital.

This hospital is situated opposite University College. It has a front building and two wings of different lengths, and may, when full, accommodate between 140 and 150 patients. The thoroughfare in front is closed for carriages; there is only a small yard at the back, and the houses closely adjoin the hospital at this part.

There are three floors over a basement, and attics in addition. The entrance is from the side, as the principal entrance-door is kept closed; it has, however, small windows, which, when open, admit fresh air. A corridor runs on the ground-floor at the back of the main building; it receives light through sky-lights, and air through perforated zinc plates. On the ground-floor we find two surgical wards, 60 feet long, 26 wide, and 16 high. They have windows on both sides; those facing the thoroughfare are about eight feet high. On the opposite side is the corridor, which is about ten feet high, and there are also windows of a smaller size—they are about five feet high. There are only 14 beds in each ward, and the cubic space allotted to each patient is very large—more than 2000 feet.

The walls are stuccoed; the lower part is coloured light brown, the upper part light blue. The windows are all sash-windows, having dark green curtains. We find open fires for warming, and no artificial means of ventilation. But there are openings in the walls on a level with the ceilings at various places, and large square holes are in the ceilings of the top wards.

Small side-wards are very numerous in this hospital for separating contagious and delirious patients; they have one window only, and contain one or two beds.

The wards in the upper floors have high opposite windows, reaching nearly to the ceiling. There is a central staircase, and one near each end of the main building; but a large lift has been recently added for hoisting food from the kitchen to the upper wards. The kitchen is in the basement, which is rather low; they cook with gas and open fires. The door to the street area is left open for the entrance of air through the basement.

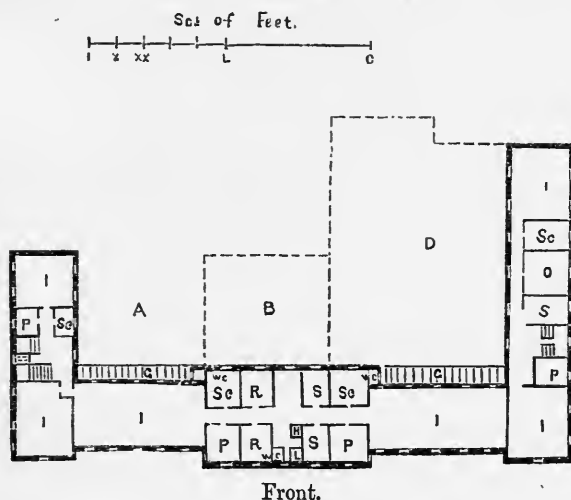
Lavatories are in different parts of the building; the sisters' day-rooms adjoin the wards; some of the waterclosets are entered from the stairs.

There is a day-room on the first floor; the nurses sleep in the attics.

Connected with the establishment is a celebrated medical school.

There are two physicians, professors of clinical medicine; one physician, a special professor of clinical medicine; an obstetric physician, three assistant physicians,* a consulting surgeon, two surgeons, professors of clinical surgery; two assistant surgeons, and a dental surgeon, lecturer on dental surgery.

FIG. 24.



UNIVERSITY COLLEGE HOSPITAL.—FIRST FLOOR.

- | | |
|-------------------------------------------------|---------------------|
| A. Out-patients' department on ground floor. | S. Sister. |
| B. Amphitheatre, Lecture-room, on ground floor. | Sc. Scullery. |
| D. Yard. | O. Ophthalmic ward. |
| P. Private (side) wards. | H. Hoist. |
| R. Resident medical officer. | L. Lavatories. |

The matron resides in the hospital, keeps the keys, and has charge of all the household goods; visits the wards, sees that patients have clean linen, food, &c.; superintends nurses and servants, and presides at the meals of the resident medical officers and pupils.

The entire nursing is at present undertaken by the Protestant sisterhood of All Saints,—the matron being a lady superior of the sisterhood. The sisters superintend and train nurses.

The nurses live in the house. They come on duty in the summer at six, and in winter at seven o'clock, and remain on duty till nine in the evening. They may absent themselves from their ward for

* But upon these gentlemen the honorary title of "Physician" has been lately conferred, although they continue the duties special to the so-called "Assistant-Physician;" that is, they see the numerous out-patients who come to the hospital, and in the absence of the clinical physician they take charge of the in-patients.

one hour, with permission of the matron. The night nurses come on duty in summer at nine, and in winter at eight o'clock in the evening, and remain on duty till eleven next day.

Admission is more liberal than in most of the other metropolitan hospitals; and the medical officers especially select such cases as are useful for clinical instruction. During the vacations the number of patients is considerably less, to save the funds of the hospital. Most of the wards are cleaned and whitewashed once a year.

The management of the affairs of the hospital is peculiar. The institution is connected with University College, and the government is vested in the council of the college, but a fair share is left to the subscribers. The council appoint a treasurer; the committee is composed of the treasurer, fourteen members elected by the governors at an annual meeting, seven appointed by the council of University College, and three delegates from the medical committee of the hospital. They have the management of the house, and meet every fortnight or oftener. There is a medical committee besides, and this consists, not of the medical officers only, but of the members of the faculty of medicine of the college in addition. They have control over the medical and surgical departments of the hospital, and the medical education of the pupils.

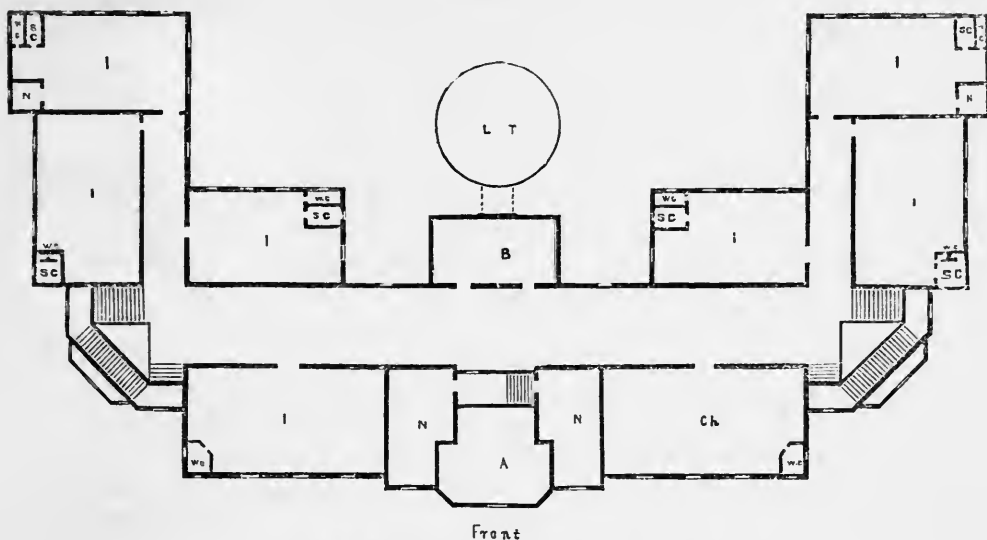
The resident medical officer, in the absence of the physicians and surgeons, is the chief medical officer of the hospital, and he has the power to interpose in the treatment of the patients when circumstances appear to him to render his interference necessary. He visits the wards every morning at nine o'clock, and prepares daily and annual reports; he is also responsible for the conduct of the business of the dispensary, and makes the post-mortem examinations of inquest cases. He must not leave the house without being replaced. He has a dispenser and assistant dispenser under him, and the physicians' assistants and clinical clerks report to him.

Westminster Hospital.

It was founded in the year 1714, but completely rebuilt and reopened in 1834. It can accommodate nearly 200 patients. It is constructed in a semi-Gothic style to correspond with the neighbouring structures. It has not a very favourable site, and is partly surrounded by houses, but there is a free space in front. The park is close by, and sometimes used by the patients. There are three floors over a basement, and attics. The building has the shape of a horse-shoe; a spacious corridor (ten feet wide) runs through the part which stands in front. There are two large windows at each end of this corridor, they form a capital means of ventilation, and

there are some back windows which might be broader. In addition, there are well staircases at the ends of the corridor where side corridors branch off, extending backwards, and these stairs have skylights at the top; the top windows open like louvres, and are used for admitting fresh air. A lift is on the right hand of the stairs.

FIG. 25.



WESTMINSTER HOSPITAL.—SECOND FLOOR.

A. Matron.

L. T. Lecture theatre on the same.

N. Nurse.

Ch. Chapel.

B. Lobby on ground floor.

The wards have the corridor on one of their sides, and, as seen by the plan, windows on two sides; but the end wards have them even on three sides. The windows are rather narrow; the top compartment revolves inwards. The number of beds in the wards varies from 9 to 12. The floors are of deal, and scrubbed. The wards are warmed by open fires and water-pipes, which are formed into coils in the corridor; through these the fresh air has to pass before entering the wards. There are outlets and inlets at various places in the walls.

Waterclosets and sculleries are partitioned off the wards, and this is of course an objectionable arrangement.

b. SPECIAL HOSPITALS.

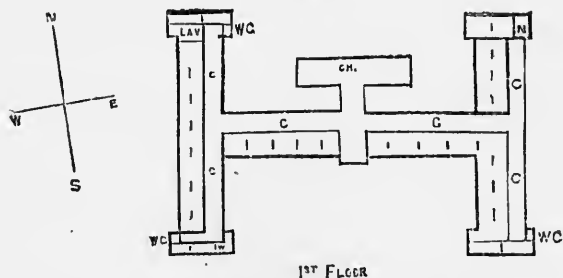
Hospital for Consumption and Diseases of the Chest, Brompton, S.W.

The first portion of this hospital was opened in 1846; it contains now 210 beds, and it is intended to enlarge it. The building has

the **H** shape, and is three stories high; two towers are conspicuous, and some portions project from the main building. The wards face the west, and the corridors the east, so that the former are in some way protected from cold winds. The female patients are on the first, and the males on the second floor. All but the end wards have windows on one side only. The wards generally contain two or three beds; a few have eight. There are sash and double plate-glass windows, about an inch intermediate space being left between the plates. The walls are coated with Parian cement of various colours. The corridors, ten feet wide, are covered with cocoa-fibre matting, and being kept of the same temperature as the wards, can be safely used as dining and day-rooms.

The western half of the building is warmed and ventilated on Dr. Arnott's plan, who first instituted here his air-pump, which was afterwards replaced by another apparatus. In winter time fresh air enters after passing over hot plates in the basement, and there are grated openings for foul air near the ceiling, which lead into the smoke-shafts. In the other wing the fresh air is similarly heated by passing through a spacious air-chamber in the basement, which contains hot-water pipes; the foul air finds its way into a tall extracting shaft, having a hot-water tank at the top; the water is heated by steam pipes from the basement. In addition to the heating apparatus fireplaces are in the wards. I found the temperature in the corridors $60\frac{1}{2}$ degrees Fahr.; it was freezing outside.

FIG. 26.



HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST,
BROMPTON.

C. Corridor.

La. Lavatories.

N. Nurse.

Ch. Chapel.

W. Matron.

The baths are of painted zinc, and the condensed steam of the boiler is used for them. The lavatories are on Jennings' system; the dispensary has a small enamelled slate tank for cod-liver oil:

it is drawn from a tap. Hot water is supplied by the condensed steam.

Steam and water-boilers are in the centre; various lifts for food and patients are worked by steam-power; steam is also used in the kitchen.

The kitchen contains a gridiron for chops and steaks which can be raised and lowered. The smoke is drawn away by a side flue. Milk is kept in large enamelled slate vessels under which a cold air-current passes. The store-rooms for meat have the walls covered with encaustic tiles to a considerable height, and white enamelled slabs.

City of London Hospital for Diseases of the Chest.

The hospital was founded in 1848; it contained about 90 patients at the time of my visit. The building has the shape of the letter **L**; the long stroke represents the main part, the short one a wing. The axis of the former lies from North North-west to South South-east. The building contains three floors over a basement, and a clock-tower corresponding to the front entrance. A broad arched corridor faces the east, and the wards open into it; the patients use it as they do at the Brompton Hospital for day-room and promenade; at one place it is transformed into a convenient dining-room by having the wall replaced by a few columns.

The male patients are on the second, females on the first, and offices, out-patients' department, and private rooms on the ground-floor. The basement is used for the kitchen, dispensary, and store-rooms. Nurses sleep at the top part in the centre.

The wards are generally small, for two or four patients, and have windows on one side only, but there are larger end wards having opposite windows three on each side and two others opposite the door. All are sash-windows, most of them double. Here the beds stand two between two windows, quite close together, which should not be the case under any circumstances. The beds themselves are comfortable; they have paillasses and good horsehair mattresses; the latter being remade outside the hospital when necessary, are a great expense, and there is a great loss of the horsehair in this institution as in others by this arrangement. The bedsteads are of iron, and high at both ends, so that foot-boards can be placed at the lower end.

There is an artificial system of heating similar to that at Brompton. An air-channel runs under the basement through the whole length of the building; the cold air enters it at one side or the other according to the direction of the wind. Hot air which has been in contact with hot-water pipes ascends through hot-air channels into

the wards. The quantity of hot and cold air admitted can be regulated by valves or air doors, but practically they are not much used. The wards have apertures for admitting hot air near the floor. The foul air is educted by channels which open near the ceilings, and lead to the foul-air shaft, the extractive power of which is heightened by a similar process to that at Brompton. At the time of my visit the temperature outside being very mild (50 degrees F.) the system acted but slightly; there was but little draught either in the underground channel or in the upper ones; besides, the windows of the corridors were open, and also those in some of the wards. The air was close in some wards at the time. They have also open fireplaces.

The waterclosets are well placed and entered from the corridor through a lobby; but they have wire-pulls for admitting water, and the wires were mostly broken. The waterclosets are not warmed, but the lavatories are.

The kitchen, which is rather low, has open fires, a range of steamers for cooking vegetables, and a hot-plate in the centre. The patients seem to belong to a superior class, and conduct themselves properly; as a rule they only stay six weeks in the house. The exceedingly low death-rate—scarcely 7 per cent.—can only be explained by the system of admittance (by letter) and the regulations. Patients who are in the last stage of consumption are considered as incurables, and not admitted.

There is a matron, two sisters, and seven nurses—all paid, a resident medical officer, a chaplain, and ten physicians attached to the hospital.

City of London Union Workhouse and Infirmary.

The buildings, which are of different elevation, stand around rectangular yards, and some are connected by open arcades on the ground-floor. The infirmary contains wards for 12 or 15 beds, which latter stand rather close, often only one foot and a half distant from each other; the ceilings are 12 feet high, the walls not plastered, the windows are sash-windows, and are on one side and at one end; the corridors are heated by hot pipes, but the wards by open fires. Air bricks on the floors, and apertures in the ceilings protected by perforated zinc plates, serve as inlets, and ventilators over the fireplaces as outlets. There are iron bedsteads with flock beds, and to purify the latter we find a flock-room, where the flocks taken out of the beds are baked in an oven. Good water-closets, some lavatories of enamelled iron, and a few baths of the same material, are attached to the wards.

The kitchen is well arranged, contains several ranges of steamers,

hot-plates, &c., and a large scullery is adjoining. The washhouse is large but there is only one machine, a wringing-machine, as everything is done by hand.

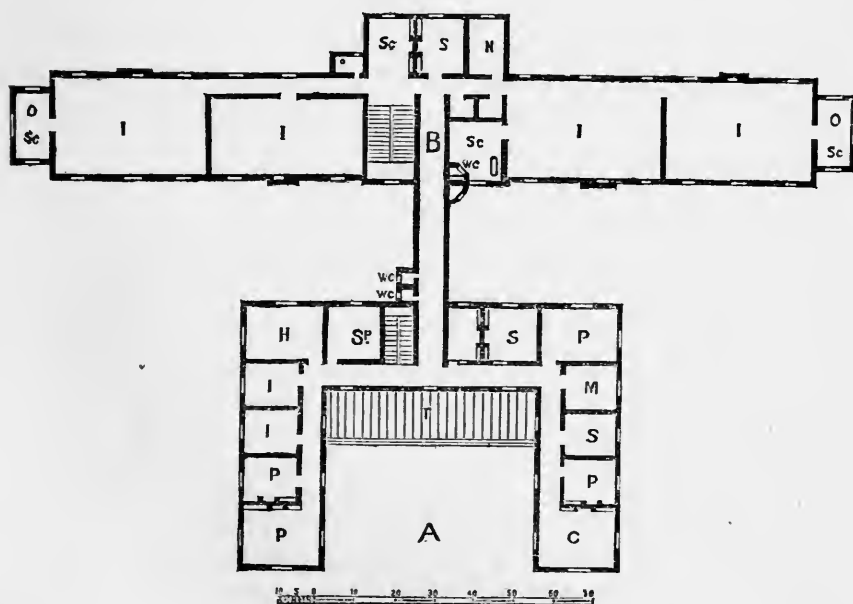
There are paid and unpaid nurses ; the number of patients was at the time of my visit 180, to whom only one medical man attends ; he has more than 400 under his care, including the bed-ridden and lunatics. There were two small-pox cases in a separate room and two females in a small lying-in ward. The number of inmates of the workhouse was 865. The dormitories are not so crowded as in other workhouses, and the establishment is altogether above the majority of its class. The patients are very well satisfied with their food.

German Hospital.

It is situated in Dalston, and consists of two parts connected by a gallery, one standing at the back of the other. It contains at present 75 beds, and is destined for Germans, but accidents are admitted without distinction.

Part A, contains on the ground-floor offices, private rooms, and the entrance-hall (τ), on the first-floor small chambers for paying patients (p), and rooms for sisters (s), matron (m), servants (c), operating rooms (u), surgical wards (i), and the splint-room (s^r).

FIG. 27.



Front.

GERMAN HOSPITAL, DALSTON.—FIRST FLOOR.

The principal wards are in the portion (B), which forms a long block, and is one floor higher than the other building. The ground-floor contains the chapel, the accident ward, and out-patients' department; the first floor four wards, two for males, one for females, and a children's ward. All the wards but one have opposite windows and are warmed by fireplaces, two of them by a Gurney stove in addition. They contain generally 10 beds each. In the centre are nurses' (n), and sisters' rooms (s). Sculleries (sc), and baths are near the stairs, and at both ends (o). All waterclosets are built out of the main building. Only part of the second-floor is at present used.

Kensington Workhouse and Infirmary.

It stands in large grounds, and has the shape of a quadrangle.

The infirmary contains mostly small wards for eleven beds, and a few larger ones. At the time of my visit the wards were overcrowded, and had two or three additional beds placed in each, in addition to the number for which they are intended. The ceilings are low, except where the roof is thrown into the wards (on the second floor). The beds stand close together, sometimes leaving hardly more than one foot clear space between them. Some wards have windows only on one side, and they are small; others have them on both sides. Some are sash-windows: many open like *louvres*.

Neither sculleries nor lavatories are attached to the wards. The infirmary contained 260 inmates, including insane, infirm, small-pox patients (two), and females who had been confined. One medical officer is attached to it, and spends five or six hours there, extra visits not included. Nurses are paid. One complained that the pay was only one shilling a week.

The whole building contained 570 inmates; and day-rooms and dormitories were of course overcrowded, as the house was not originally intended for so large a number. I was even informed of the startling fact, that to make room for all applicants, two persons had to be placed in some of the beds, which are small.

The kitchen is too small for the increased number. Children are sent into the country after they have been put in a fit state of cleanliness in the workhouse.

London Fever Hospital, Islington.

The institution lies in a part of the town which is reputed healthy: it stands a little removed from the thoroughfare, and is enclosed by moderate grounds. It is built on the corridor and block plan combined. A corridor on the ground floor is open at

some places, so that the circulation of air is facilitated. Some new blocks at the back stand free, but are connected with the old part by a short passage. The centre building has three floors, the others one or two.

The smaller wards are for two or three beds, and used for noisy patients, or those with eruptive fevers. The acute wards (I) for typhus, typhoid, enteric fever, at both sides of the yard, are larger. A large ward has nine opposite windows and a partition in the middle, which runs through the length of it; the partition is formed by a party-wall, which is different in both wards. The party-wall has large arched open spaces, which on the right side are to a great extent filled up by cupboards, and windows above them. On the left side this is the case to a very small extent; the windows or glass partition having a low elevation. Each double ward contains six fireplaces, two being in the centre, back to back, and four at the ends. Fresh air is admitted in many ways: first, through permanently open brattices at the top of the windows; the windows being six feet from the floor, arched, and on the sash principle. Besides, we find some open gratings in the walls between the beds, and less than a foot from the floor. Further, we find ventilators in the ceilings, and air can be forced in near the floor underneath the windows by a fan. The fan is pretty large, and has six flutes, or blades. It stands in the engine-room, and is worked three times a week, but in cold weather it is not used. The air is taken from near the engine-room; the new part is not ventilated by the fan.

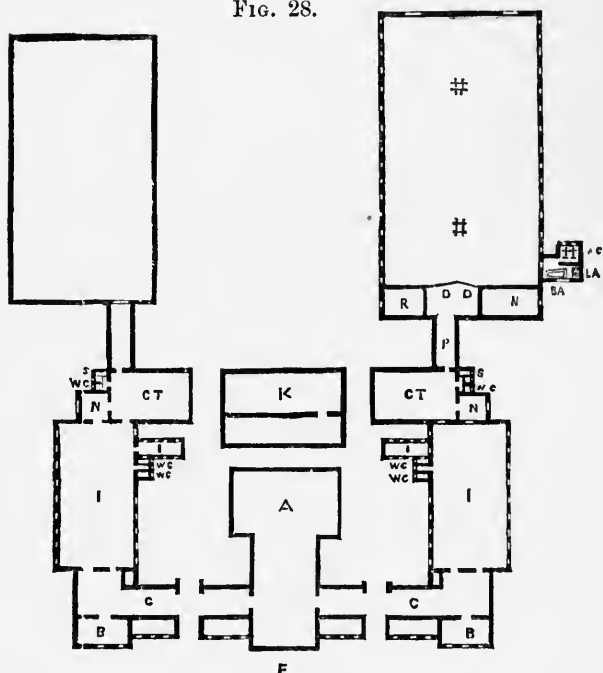
There are thirty-four beds in each double ward, and they are lower than I found them anywhere. I had one measured, and it was one foot four inches high. This must be inconvenient for the medical men and nurses, but of course the patients are less likely to come to harm should they tumble out of bed.

The nurse overlooks the wards from a window; the smaller and convalescent wards are arranged on a similar plan as the large ones as regards warming and ventilation.

The patients enjoy ample cubic space, about 2000 feet. The waterclosets are well placed, a few on the first floor excepted, which have windows opening on the stairs and *not* communicating with the atmosphere. The tea-kitchens are much used for the patients, and also contain a bath. The kitchen is of moderate dimensions; no steam is used. The engine-room and wash-house are under the same roof. In the latter is a washing-wheel, steam-boiler, wringing machine, and horses, to dry the cloth by hot air. The cloth is washed before and after it is boiled. At the back of the kitchen stand two new wards; one at the left completed two years ago,

and divided in two by a wooden partition. It is not in use at present; the other may be considered almost a model ward. It is 113 feet long by forty-eight feet, and eighteen feet eight inches high at the highest part. There are windows on opposite sides; sixteen on one, fifteen on the other, and two end windows. The windows are somewhat larger and higher than those of the old part. Through the centre runs an incomplete partition formed by the cupboards, as in the other wards, but with open spaces near the flooring. The walls are of Parian cement up to a height of five feet; the rest is plastered. A long beam in the centre is supported by seven iron columns, painted a reddish brown.

FIG. 28.



LONDON FEVER HOSPITAL.—FIRST FLOOR. NEW WARD.

- | | |
|------------------------------------------|-----------------------------|
| F. Front. | B.A. Bath. |
| A. Private rooms, house surgeon, &c. | I.A. Lavatory. |
| B. Searlet-fever patients. | D. Door. |
| C. Corridor. | N. Nurse. |
| C. T. Convalescent typhoid ward. | R. Stores |
| K. Kitchen, Wash-house, Engine-room, &c. | P. Passage to the new ward. |
| S. Sink. | |

For warming, we find four stoves without chimneys; two on each side. Fresh air ascends through them after being warmed; the

flues pass under the floor to the wall, and can be inspected from an aperture outside in the yard. A little paper or woodscrappings lighted here are said to restore a draught in the right direction, should it smoke. The floor is hollow, and fresh air is admitted through it at some places besides through brattices and perforated zinc. Six large square apertures are in the ceiling, four educting foul air; and to facilitate this, fresh air is admitted through the outer wall near the flues, for the purpose of pressing the foul air in the direction of the said apertures. It is questionable if this is done in an efficient manner. The waterclosets are well placed, and ventilated by brattices. There is a bath of enamelled zinc, and six lavatories near it.

We find a coach-house, where a fever-carriage is kept: two beds can be slipped in. There is also a bed-carriage, consisting of a bed on castors, with a wheel and handle; there is a resident medical officer, and nearly fifty nurses. I was informed that the nurses almost invariably catch the fever: six did so last year. Patients are admitted by letter, and on payment; but it often happens that acute cases, which are not fever cases, are received. These cases were about ten per cent. last year, and some of them caught the fever in the hospital. Parochial boards contribute to a considerable extent to the funds of the institution.

Small-pox Hospital, London,

Situated at Highgate Hill, in a favourable position; can accommodate about 100 patients. The building is an oblong block, with a central corridor and wards on each side of it. They are on two floors only, and have large front-windows, and small ones looking into the corridor. In addition to open fires, we find a system of artificial heating and ventilation much resembling that of Duvoir, only the air does not pass through water-stoves in the wards, but over hot plates before it is admitted.

Admission is granted by governor's letter, or on payment of small sums.

York Road General Lying-in Hospital, London,

Contains two floors, basement, and attics, and can accommodate 30 patients. The wards are heated by fireplaces and air which passes over hot plates before it enters. A matron, a midwife, and one or two students reside in the house. An extensive out-patients' department is connected with it. There is one larger lying-in hospital in London, Queen Charlotte's, for 50 beds; there is one in Endell-street, and a fourth in City-road, for about 20 in-patients each.

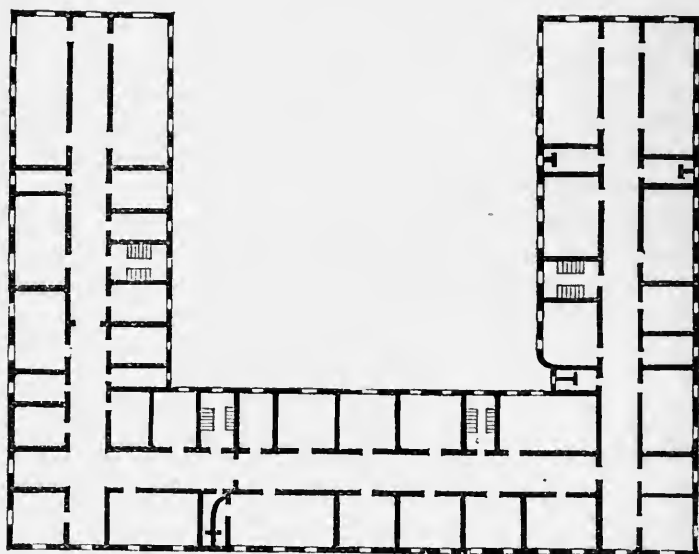
MANCHESTER HOSPITALS.

Manchester Royal Infirmary.

It was founded in 1797. Its site is in the centre of the town, but it stands by itself in a large, open, and noble square. It can accommodate 250 patients.

The hospital has the shape of an open quadrangle. It has an imposing exterior, heightened by lofty columns and a central clock-tower, with a fine cupola.

FIG. 29.



Front.

MANCHESTER ROYAL INFIRMARY.—FIRST FLOOR.

It is built on an objectionable plan. A corridor runs through the centre of the building, and wards are on both sides; but it has been lately much improved by removing partition walls and cutting apertures into walls where needed. At the time of my visit the process of improving was going on in some parts. All the end wards, which were divided by brick partitions about half the height of the room, are or will soon be large wards, with windows on two sides, and louvres over the doors.

The corridor is spacious, nine feet wide, warmed by hot pipes. Offices and private rooms are on the ground-floor, the wards on the two upper ones. The female patients occupy more the wings, the males more the centre part. The corridors and wards are lofty, oil-

painted of a pleasing light green colour. The floors are mostly oiled. Many new and good beds are in place of the old ones; they mostly stand four feet apart. There are sash-windows, open fireplaces, self-acting waterclosets, enamelled earthenware baths and lavatories.

The wash-house is in the yard. It is lofty; in the centre stands a wheel, where the clothes are subjected to the action of soap and soda. The washing-trays stand near the wall. A wringing machine, like that of Guy's Hospital, is used for the cloth before it goes into the drying-room. In the latter we find the horses moving on castors. Mangling machines are worked by steam. All the cloth is marked and numbered, to be stacked properly. A new boiler-house was in course of construction.

Thirty nurses attend to the patients—six head, six night, and eighteen assistant nurses; six physicians, and three assistant physicians; six surgeons, and three resident medical officers. One of the latter lately died of typhus.

There are some smaller and special hospitals in Manchester: St. Mary's Hospital, for 30 beds; Salford and Pendleton Royal Hospital, 40 beds; Clinical Hospital for Children; Ear Institution and Eye Hospital, 25 beds; General Hospital and Dispensary for Sick Children, 25 beds.

Newcastle Infirmary.

A hospital for 215 beds, upon a hill close to the railway station, built in irregular form on the corridor plan; has a front building and one wing, three stories high; contains six large new wards, 111 feet by 24, and 14 feet 6 inches high, holding 24 beds. They afford about 1600 cubic feet to each patient.* There are eight old wards on different floors of the building, of irregular shape, and deficient in space. The syphilitic are in separate lock-wards.

There is a separate fever hospital in Newcastle for 45 beds.

Northampton Hospital.

It can accommodate 126 patients. It is well constructed, though built more than 100 years ago (1744). Its site is beautiful; it stands in not less than sixteen acres of ground. There are large and small wards; the cubic space afforded to the patients is ample. The wards are warmed by open fires, and there is no system of arti-

* The following plan of improving the floors has given great satisfaction:—After planing them they are saturated with two coats of boiled linseed oil mixed with a little umber to give tone, then a couple of coats of best oak varnish are superimposed, which should be allowed three weeks to dry and harden.

ficial ventilation. The only noteworthy arrangement is, that a subsidiary building stands near the hospital, and is used by convalescents. It contains a female and a male ward for seven beds each.

Norfolk and Norwich Hospital,

Is situated in the town, although originally erected in the open country, but the houses have come up to it; can hold 150 patients, and consists of a centre and two wings of irregular shape. The wards are mostly large; some have opposite windows, and afford 1000 to 1200 cubic feet to a patient. Heating is effected by open fires. The hospital has been almost wholly rebuilt and much improved.

Nottingham General Hospital

Is situated in the town, on a hill near the market-place; has an old central part, three stories high over a basement, to which latter two wings were added, a smaller one on the left, and a larger one on the right side. A separate fever-house is also a modern addition; it stands in a line with the central building, but separated from it by the chapel. The central part is traversed by a corridor, and the wards lie in front and back of it. We find two day-rooms and nineteen wards, which can accommodate forty-two patients, but do not afford sufficient cubic space when full. There is a special female and male eye-ward, and an out-patients' department.

There are fifteen nurses living on the premises, three physicians, four surgeons, and two resident medical officers. The defective arrangements of the fever wards have already been made the subject of criticism by other authors.

There is also a Union hospital and dispensary in Nottingham; 200 in-patients can be accommodated by it.

OXFORD HOSPITALS.

The Radcliffe Infirmary, Oxford,

Stands in large grounds just outside the town, and is composed of an old building dating from the year 1770, and two new ones; they form the letter T. The new buildings are only one story high, and stand in a line, whereas the old one has three floors over a basement and attics.

The old block has a central corridor and end wards, which are pretty large, and have sash-windows on more than one side, but the wards in the centre are smaller, and have windows on one side only. There is a large children's ward on the second floor. The walls are plastered, the floors of deal, and scrubbed; the beds of

iron, with woollen mattresses, and cocoanut-fibre matting under them.

Some of the waterclosets and most of the nurses' rooms are badly placed, especially some which are squeezed in between waterclosets. The baths are mostly of painted zinc; I saw one of glazed tiles.

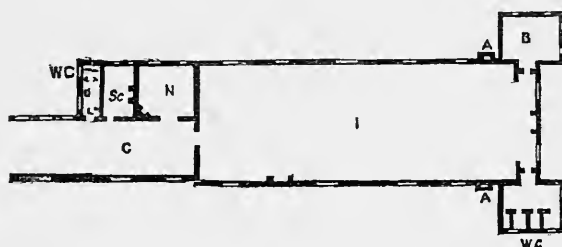
The passages are warmed by hot flues, the wards by open fires. There are ventilators in the ceilings and walls.

The kitchen is in the basement of this part; it is pretty large, and contains, in addition to the open fires, steamers for vegetables.

Of the new buildings, one is the accident ward, the other serves as the out-patients' department. The ward is 78 by 26½ feet, and 18 feet high. The walls are coated with Keene's cement, which is polished and coloured a reddish brown, but unfortunately very blotchy; the ceiling is of white polished cement, with transverse varnished deal beams. The floor is of polished oak, except under the beds, where it is of glazed tiles, white and with a red border; the sash-windows are opposite, and of plate-glass, and there are two end windows. The lower part of the windows contains a glass frame, two feet four inches high, which is fastened to them by screws; it is intended to prevent draughts, and makes the lower part of the windows double, but gives some trouble to the servants when it has to be unscrewed.

The beds are the same as in the other wards; one stands between two windows; they have bed-pulls over the patient's head, bed-curtains, and side-tables, the latter on an American model. They are called locker-tables. The top of them may be lowered or raised, and stretch across the bed.

FIG. 30.



RADCLIFFE INFIRMARY, OXFORD.—NEW WING.

- | | | |
|----------------------|--------------|-----------------|
| A. Smoke flues. | C. Corridor. | L. Linen shoot. |
| B. Bath, lavatories. | D. Sink. | |

Each patient, of whom 20 can be accommodated, has a cubic space allotted of more than 1800 feet.

Waterclosets, baths, and lavatories are built out at the end in a

similar way as in the Hospital St. Jean in Brussels. They are separated from the ward by swing-doors, and outside these is a warm-air flue.

The ward is warmed by two fireplaces, and warm fresh air can be admitted through six gratings which we observe in the centre of the floor. For ventilation we find trap-doors in the ceiling of considerable dimensions, and ventilators over the beds; they have valves which should open by their own weight, but do not act.

The out-patients' department is completely separated from the hospital, and the only objectionable arrangement is that some of the consulting-rooms have only one door for admission and egress. The cod-liver oil in the dispensary is kept in little stone barrels with taps. A bath-room is attached to this part of the hospital.

A new chapel, presented to the hospital, stands at the right-hand side of the entrance-court.

The Workhouse and Infirmary, Oxford.

This is a recent building. The workhouse was opened two years and the infirmary three months ago. Both are of moderate dimensions, the total number of inmates being 200. Children are not admitted. The house stands in the country on rather low ground. The infirmary, which contained 40 patients, but can hold 50, is situated at the back of the workhouse, and not, or at least not yet, connected with the other part.

The wards are for nine or ten patients, they have opposite sash-windows, and afford more cubic space to the patients than those of London workhouses. The walls are of brick, not plastered but whitewashed; the ceilings (in accordance with the regulations) only 12 feet high. The beds have woollen mattresses. Waterclosets and lavatories with slate slabs are attached to the wards. The latter are warmed by fireplaces, and there are ventilators in the ceilings and walls. A dead-house lies separate.

The cost of constructing this infirmary was about 4000*l*. The workhouse contains day-rooms and dormitories; the latter have mostly ten beds, with reasonable space between each. The kitchen is high, and contains steamers for boiling vegetables. The corridors are warmed by hot pipes. The wash-house does not contain any machines.

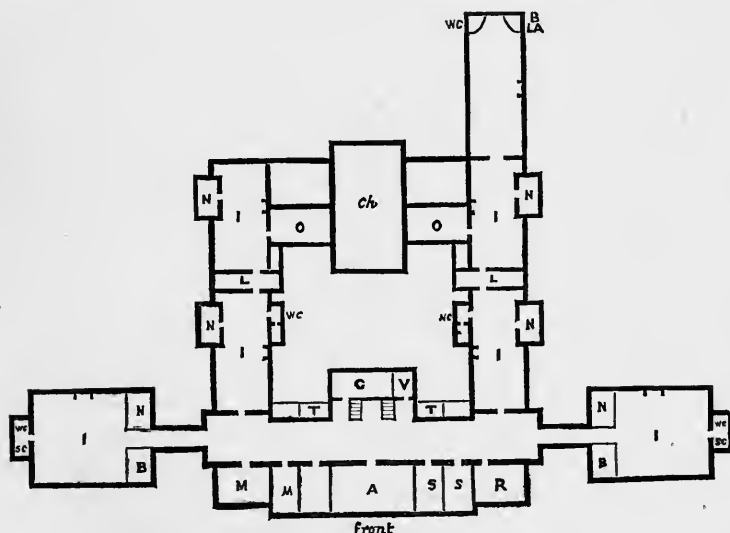
The Reading Hospital and Dispensary.

In the rapidly increasing town of Reading, which numbers about 30,000 inhabitants, a hospital was founded in 1839, and additional buildings were constructed, the last of them about a year ago; the establishment can accommodate now more than 120 patients.

The plan of the building is peculiar, and I therefore append a sketch, from which it is seen that part of the buildings stand round a closed court, but other newer parts are exposed to the free circulation of the atmosphere. All the wards, the old as well as the new ones, have opposite sash-windows; some of the latter are very high and contain three compartments; the patients receive ample cubic space, which varies between 1400 and 1700 feet. The nurses' rooms are extremely well arranged; we find lavatories with slate slabs, and the waterclosets well placed but not warmed; the stairs are of stone, and the principal corridor is broad. There is unfortunately no means of warming the bath-rooms, but the baths are comfortable; they are of zinc painted white, and glazed tiles. The walls are plastered; some white, others coloured. They burn gas, but a large ward is provided with one burner only, over the mantelshef.

The passages are warmed by coils of hot pipes, the wards by large fireplaces. The principal means of ventilation are trap-doors in the ceilings, and ventilators in the walls over alternate windows. The floors, excepting those in the new wards, are of deal.

FIG. 31.



READING HOSPITAL.—FIRST FLOOR.

- | | | |
|--------------------|---------------------------|-------------------|
| A. Board-room. | V. Vapour-bath. | S. House-surgeon. |
| B. Bath. | T. Stores. | M. Matron. |
| C. Operation-room. | R. Officers' dining-room. | L. Laundry. |
| La. Lavatory. | Ch. Chapel. | |

There is a large new ward built out at the back; it was opened

last year, and can accommodate 20 patients. It is high and lofty, has opposite windows, three on one side and seven on the other; they contain three compartments each. Walls and flooring are on improved principles, warming and ventilation as in the other wards. The waterclosets, baths and lavatories, are at the further end of the ward. They are also on improved principles, but the space allotted to them seems somewhat limited, owing most likely to the circumstance that an end window was desired.

The out-patients' department is on the ground-floor of the old part, and affords relief to a great number of applicants.

A new large and airy convalescent room was added two years ago; a patients' library has been recently instituted by the chaplain. A large kitchen is in the basement; made higher by carrying the floor lower; steamers are a recent addition.

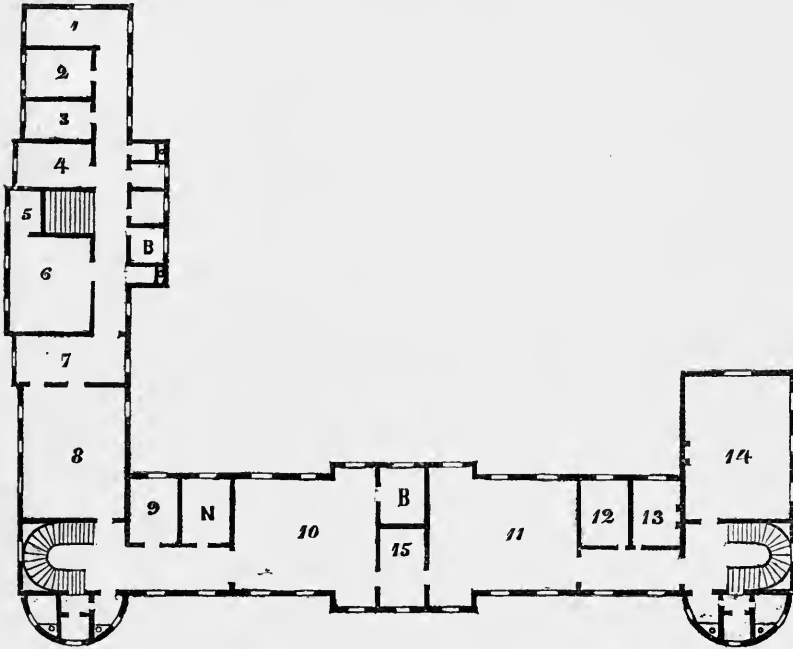
The nurses come from the Bath Institution; and I cannot forbear remarking that the red (Garibaldi) flannel jackets they wear are not a very appropriate dress. At the time of my visit, of all the 120 patients not a single one was an acute case.

Sheffield General Infirmary.

In the town of Sheffield, which has lately increased with unexampled rapidity, we find a large general infirmary for 200 patients which was built in 1797, but has been recently enlarged. The building was originally erected in the country, but the houses now extend to it. It is, however, surrounded by large grounds. As seen by the plan, the building has the shape of the letter L. The old portion is built on the block, the more recent additions on the corridor plan. The medical officers are of an unanimous opinion that the patients make a better recovery in the old building than in the new ones, and sometimes the patients are transferred for this reason from the latter to the former. The wards are not large—for 8 or 12 patients—affording 1300 cubic feet to each. The walls have a yellow and not very pleasant colour, which may have been selected on account of cheapness. Brattices are found over the doors for ventilation, and ventilators in some of the ceilings, especially those under the cupola. Where the windows are opposite, a simple contrivance is used for admitting fresh air even at night. The lower sash is raised, and a board half a foot wide placed as a support under the lower border. The air finds its way into the ward by ascending through the open space left between the lower and upper sash. There are Arnott's valves, but they are not used and do not act. Open fireplaces are used for warming the wards, and hot flues for the passages and hall. There are also day-rooms.

The waterclosets are all well-placed ; there are lavatories and baths of zinc coated with enamel : four cisterns supply the water. They are of iron coated with a patent paint, and that has a charcoal filter. The pipes are of lead, and not being properly protected against the cold they had burst shortly before my visit by the

FIG. 32.



Front.

SHEFFIELD GENERAL INFIRMARY.—FIRST FLOOR.

	Beds.		Beds.
1. Male ward, containing . . .	4	7. Women's ward, containing	4
2. Boys' " " " . . .	8	8. " " " " " " " " " " " "	12
3. " " " " " " " " " " " "	3	9. " " " " " " " " " " " "	3
4. Assistant Nurse's bed-room.		10. " " " " " " " " " " " "	12
5. Nurse's room.		11. " " " " " " " " " " " "	12
6. Boys' ward, containing . . .	7	12. Senr. Assist. House-Surg.'s bed-room.	
		13. Junr. Assistant House-Surgeon's bed-room.	
14. Chapel.		15. Examining room.	
		B. Bath.	
		N. Nurse.	

water freezing in them. A museum is on the upper-floor ; it contains many specimens of black lungs.

The kitchen, which is in the basement, has only open fires for cooking. The wash-house is detached ; a machine stands in the centre.

As regards the administration, admission is by letter ; but there are numerous accident cases always admitted at once ; they afford together with the medical cases ample means of instruction to the pupils visiting the hospital. There is a resident and assistant medical officer, physicians, surgeons, and 9 or 10 nurses.

Fever patients, who were formerly received into a special and separate part of the house, are now admitted into the general wards, and, as I was informed, with no evil consequences. Neither medical men, nurses, or patients had caught the disease since this change was made (now some years ago).

There is a rich medical library, and a patients' library, founded five years ago by the chaplain, and kept in his office. It contains two thousand volumes, presented by friends or bought with money voluntarily contributed. The books are of various descriptions, religious and philosophical works, novels, &c. They afford entertainment and useful instruction to the convalescents, and as these exchange them between themselves, the chaplain, who kindly and judiciously superintends this department, is not much troubled.

Sheffield Public Hospital and Dispensary.

This is a small hospital for 50 beds ; originally it was a dispensary, founded 40 years ago, but recently two wings have been added to the centre building. The latter contains committee-room and offices, and has three floors ; the wings are on the block plan with opposite sash-windows, and are of two floors only. The centre part has open verandahs instead of corridors. The wards contain about ten beds, and there are a few side wards. They offer nothing remarkable as regards construction.

The cost of maintenance is about £3700 per year.

The Salop Infirmary, Shrewsbury,

Stands on elevated ground, near the river Severn ; it is a building five stories high. There are 17 wards on the three upper floors ; two on the ground floor. They all lie in front or back of a central corridor, which traverses the building and has water-closets and baths at each end. Twelve of the wards are end wards, and have windows on two sides.

Taunton and Somerset Hospital.

The hospital is situated in East Reach : it consists of an old central part, four stories high, and two new wings. Ninety patients find accommodation. The new wards are much superior to the old ones ; they have opposite windows and perforated zinc plates for

ventilation, and ventilators near the ceilings besides. They are heated by open fires.

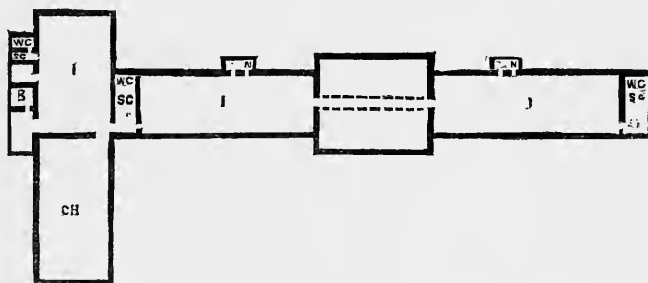
Whitehaven Hospital.

Smaller than the last one (for fifty-four beds), but like it, also possesses an old part which is deficient in many respects, and a new one which affords improved accommodation to the patients.

Hants County Hospital, Winchester.

It consisted originally of a centre and two wings, but additions have been made to one of the wings. There is room for about 80 patients. None are accommodated in the central building, which is used for offices and private rooms. The large wards in the wings, two in each respectively, contain 15 beds, and the wards in the new part 10. The latter are somewhat loftier than the old ones; the larger wards have opposite sash-windows (*see* Fig. 1, No. 2). The hospital has cesspools, as Winchester lies low and has no sewers. It is stated that before these cesspools were well ventilated and disinfected by charcoal filters the hospital was very unhealthy.

FIG. 33.



HANTS COUNTY HOSPITAL, WINCHESTER.—FIRST FLOOR.

Ch. Chapel. Sc. Scullery. N. Nurse's room and pantry. T. Ward.

Windsor Infirmary.

This institution was lately visited by her Majesty the Queen, who was very pleased with the arrangements. In its present form it has been in existence since 1857: it was originally a dispensary. The building is one floor high, and can accommodate only twenty patients; a central corridor runs through the house, and the wards open into it. There are three principal wards, one male for eight beds, a female one for the same number, and a smaller accident ward. They are lofty, have walls coated with Parian cement, coloured green, and opposite windows; two of which are, however, small, and placed

high. The beds have woollen and horsehair mattresses; the wards are warmed by open fires, and have ventilators in the windows and ceilings. The latter communicate with the roof. The kitchen is too low, and this might be improved by carrying the floor a few feet lower. There is an operating-room, with skylight only.

The management is in the hands of a committee; a medical officer and a matron live in the house. There is one day and one night nurse. The washing is done in the infirmary. Bradford's patent machine is used.

South Staffordshire General Hospital, Wolverhampton,

For about one hundred beds, situated in the town, built in the **H** shape: it has three floors over a basement; the wards are rooms situated in front and back of a central corridor. They are heated by fires; the foul air is drawn into channels by a fire, which is in a central shaft. The corridors are heated by hot-water pipes.

All the nurses live in the house (in the attics).

Worcester General Infirmary,

For the same number of beds, contains large wards, and these afford a cubic space of at least 1300 feet to each patient. The beds stand far apart, the floors are polished; there are plenty of apertures for admitting fresh and letting out foul air.

York County Hospital

Stands in ample grounds; it contains only four wards for twenty patients each, divided, however, by party-walls into four unequal compartments. They were heated originally by hot air, which was forced in by machinery, and eduction pipes led off the foul air. The windows did not open at all. After preserving this system for nine years (1850-59), it had to be given up, because patients and medical officers complained; and there are now open fireplaces, and the surgical operations have much better results.

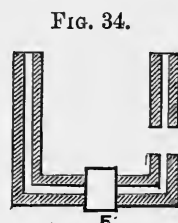
English Military Hospitals.

These are only small buildings, as the army is not numerous, and it is rare that more troops than one regiment is quartered at one place. The construction, consequently, offers no difficulties. For one regiment the Commission appointed for improving the condition of Barracks and Hospitals consider a hospital containing sixty beds sufficient. Two wards are on the ground-floor, with windows on both sides, divided by the staircase, the superintendent's little room between them; offices are on the first floor; kitchen and dispensary in the yard, connected with the principal building by covered galleries.

The cubic space for each patient is 1500 feet, or 1800 in warm climates. The wards are warmed by open firegrates, and, as a rule, there is no artificial ventilation. Of course the Herbert Hospital is built on an entirely different plan. (See page 108.)

Naval Hospital, Haslar, Portsmouth.

I mention this hospital briefly, on account of the singularity of its construction and the large number of patients it can receive (nearly 1200). It is destined for marines, and the buildings form a square, open on one side, but they stand in a double row, leaving a space between them. All the wards have windows on both opposite sides, and contain 14 beds.



F. Front.
NAVAL HOSPITAL,
HASLAR.

The Royal Victoria Hospital, Netley.

This is a large hospital-hospice, built on the corridor plan, with which a school for medical officers of the army is connected. It consists of a number of buildings.





We find a long front building, containing wards for 9 or 12 patients. They have opposite windows looking on one side into the corridor. Behind this building stands another, which contains offices for administration and the dispensary, and is connected with the front building. A long block, with two wings, stands further at the back. It contains dead-house, wash-house, &c., and separation rooms for infectious diseases. A corridor runs on its ground-floor, and connects it with the other building.

The establishment, considered as a large convalescent institution at the sea-side, seems to be well adapted for the purpose, and contains many modern improvements.

Hospital Tents, Marquees, and Huts ; Floating Hospitals.

They are used in time of war. The Commission for improvement of Barracks and Hospitals recommend the following dimensions :—The tents 14 feet in diameter and 10 feet high, the marquees 33 feet long, 12 feet broad, five high at the sides, and 12 feet in the middle. Both should have ample openings around the top of the poles, for ventilation. It is very important that the ground be properly selected ; all damp or malarious districts to be avoided.

Huts are of wood or iron, built a little above the ground, and roofed over. They should have the proper number of inlets and

outlets for ventilation (ridge ventilation), and require fire-grates in cold climates. The Commission for improvement, &c., considers the following the best arrangement:— because the wind sweeps freely through. The next best plan would be (*en échelon*)  if there is no room to place the huts in one  line, or they might be placed in quadrangle form if the enclosed space is ample .

Floating Hospitals, Hospital Ships,

Are used in time of war (*see* American hospitals) ; ships should not be used for hospitals in time of peace. It is advisable to place fever cases and contagious diseases on separate ships. The hospitals should be well ventilated, and the greatest care bestowed on cleanliness and disinfection.

Malta.

Of the proposed hospitals and other public buildings, only a very small part is as yet finished. The plans were prepared by Mr. H. T. Wyatt of London, and are throughout on the pavilion principle.

There is a military general hospital ; it consists of six pavilions, of which two are smaller than the others. They are two floors high, placed parallel to each other, and the block for administration stands in a rectangle to them, as in the plan of the hospital of Philippeville.* There are two separate buildings for nurses and baths respectively.

There is further an asylum for aged and infirm persons, 500 of each sex. It is composed of eight pavilions two stories high. Four of them stand round two large rectangular courts respectively ; in the centre of each court is a day-room. The buildings for washing, cooking, offices, bedcarding, &c., stand detached at the back of the said courts. A new feature is that the waterclosets and lavabos are constructed on modern principles ; they will be detached from the wards, and accessible under open arcades.

Closely connected with the above are the orphan asylum and the female prison, the male prison, and the Magdalen asylum and reformatory.

A civil hospital for 290 beds will receive the incurables and the sick. Double pavilions (similar to those of the Herbert Hospital) stand on each side of a spacious yard ; they contain wards for 32 beds, waterclosets and baths at each end, dining and day-rooms

* *See* page 178.

detached, but accessible under corridors. Two small blocks for contagious diseases (for male and female patients respectively) stand detached at the back.

The cubic space for the patients is 1500. The roofs are used for promenades.

Lastly, there is a lunatic asylum, which is already occupied.

We might feel surprised that so many large buildings are required for the poor of Malta, as the island contains only 6000 inhabitants; but I am informed that half of them are paupers, and the number of female paupers is especially large; further we might wonder why all the buildings are placed close together. But this is considered preferable on account of centralization. The locality where the buildings will be situated is considered as the most healthy on the island.


Indian Hospitals.

The hospitals in East India are native or military hospitals. The former are generally sheds, where the sick natives are often placed, not on beds but only on mats. The patients receive nothing but medicine; they do their own cooking as prescribed by their religion. According to the descriptions given of the buildings they are deficient in every particular, and need much improvement.

The military hospitals are not quite so bad as the native ones, and have become lately the subject of greater attention. There are some points of particular importance in their construction. First, as regards the site: swampy and malarious districts have especially to be avoided; the soil should not only be dry, but the foundation where the hospital is built, covered with concrete. The wards, as all authorities agree, should be raised from the ground.* So great an amount of disease and death has been traced in China to the circumstance of Europeans' and soldiers' dwellings being close to the ground, that this mode of building has been thoroughly abandoned. In hospitals the basement or ground floor should be used for offices and stores only.

Double roofs are now generally employed, and made slanting and not terraced. They can be arranged for ridge ventilation. Double verandahs (an inner and an outer one) are considered by Dr. Gordon preferable to single ones, although they darken the room. The Bengal standard plan, as proposed by the Commission for Improvement of Barracks, &c., in India, is on the same principles. The outer verandahs are

* Miss Nightingale; Dr. Gordon, Army Reports of India. London: Churchill, 1866. Report of the Commission on the Sanitary State of the Army in India. 1863.

open, the inner ones glazed, and there are opposite doors and windows. Though  a great many verandahs can be dispensed with in Italy and Spain, they may still be a necessity in India. I should, however, think single ones preferable; and they might, perhaps, in many instances be replaced by double Venetian blinds.

The privies are generally approached by passages; the Commission recommends that they should be detached, and also the out-buildings; and a good plan is to arrange the buildings *en échelon*.

Nowhere is cooking more neglected than in India. At this present moment, Dr. Gordon writes, there is not, with one or two exceptions, a cooking range in any regimental hospital; the cooking place is only a "chula," *i.e.* on the ground; there are no means of cooking a pudding; rice is baked in the cinders. The cooks are untrained, and obtain less wages than servants.

Warming is not needed in India, except on the hills. As for ventilation, other rules have to be observed than with us. First, the cubic space allotted to a patient should be larger, at least 1800 feet, and 2000 in unhealthy places. Secondly, the great object is, not to obtain pure air from outside, but pure and cool air. For this we find various appliances used in India. The thermantidote is a fan by which the air is propelled into the rooms, and forced through wet scented grass roots. There are the punkahs; they are suspended from the ceiling at short intervals, and kept swinging over the heads of the patients by coolies. Tatties are light bamboo frames, in which the slender roots of a fragrant grass, kuskus, are arranged. (For engravings of these, see report of the Commission, p. 428.) The tatties are placed in the doorways, on the windward side, and kept well watered; they are called inestimable by Dr. Gordon.

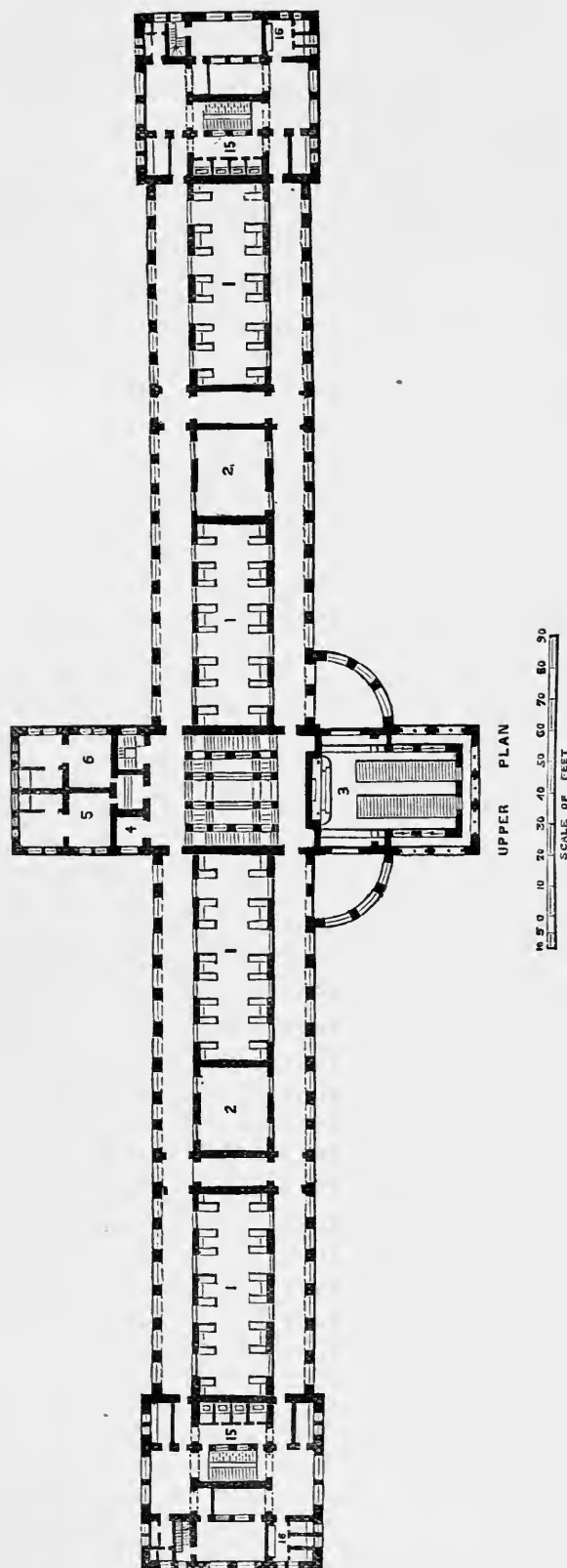
As regards the system of nursing and attendance in Indian hospitals, I only mention the fact, confirmed by several writers, that one matron to a battalion is considered sufficient, and that medical men and nurses often live at a great distance from the building.

The European General Hospital, Bombay.

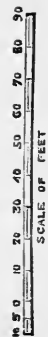
This building is now in course of construction, after a design of Mr. T. Roger Smith, architect, of London, which was approved of in the year 1864. I copy the plan (*See* p. 157) from the *Builder*, and the following is an extract from the description:—

The whole building has a frontage of 500 feet, and is 66 feet high. The ground-floor is raised three feet above the level of the surrounding ground, and this story, which has a clear height of 14

Fig. 35.



UPPER PLAN



EUROPEAN HOSPITAL, BOMBAY.—UPPER FLOOR.

- 1. Ward.
- 2. Surgeon.
- 3. Chapel.
- 4. Patients' lift.
- 5. Operating room.
- 6. Nurse.

feet, is devoted to receiving, dispensing, and accident wards ; living, sleeping, and bath-rooms for various officers, and to other similar services.

The two upper floors have a clear height of 18 feet, and contain the wards (1), which are on the first floor 23 feet 6 inches, and on the second 24 feet wide. Adjoining is a surgery (2). On the first floor over the "Porte-cochère" is placed the chapel (3) forming one limb of a kind of transept, while at the back the other limb of the transept on the same floor is occupied by an operating (5) and nurses' room (6). In front of all rooms—front and back—stretches a verandah 10 feet wide. Portions of this will be made use of by the servants, and hence scullery and nurses' room are not needed. At each extremity baths and lavatories are found ; and separated from these by a wide space, with a free current of air always playing through it, are placed the conveniences. Stairs and floors are fire-proof.

Hoists (4) are in the centre. The ventilation is carried on by windows, which are very lofty and opposite each other. The lower part of each window has casements acting like doors. The upper part has casements hung at the bottom to transoms and opening inwards. Ventilating openings are also provided close to the ceiling. In each window-frame there are hung not only glazed casements opening inwards, but also casements filled with Venetian blinds opening outward, and it is also proposed to supply means for closing when necessary the outer openings of the verandahs.

Missionary Hospital, Canton.

Dr. Hobson has from time to time given reports on the above establishment. The building can receive between 150 and 200 in-patients, but the out-patients' department is of great importance. The yearly number of out-patients is 2000. Dr. Hobson has the assistance of a native, and the dispensing is done by two coolies.

IRISH HOSPITALS.

As regards construction, they are almost all built on the corridor plan, and have no artificial system of heating or ventilation. As for regulations, their system of admission is on more liberal principles than in England ; no letters are required, and no disease is excluded, with slight exceptions. Medical and surgical cases are generally found in equal numbers. In some hospitals out-patients receive advice only, but no gratuitous medicines, in the same way as we find the consultations gratuites in France. Paying patients

are received into private wards. Religious orders attend to the nursing in some institutions; committees manage the affairs of the hospitals; medical schools are attached to almost every Dublin charity; the medical officers generally attend in rotation; medical officers of workhouse infirmaries do not supply medicines.

Belfast General Hospital,

Is situated in the town, has four floors; the basement is used for domestic purposes, the three other floors almost exclusively for wards. The corridors run in the centre of the building, and have wards in front and behind; they are shorter in the two higher floors, as the end wards extend from back to front. There are about 100 beds in 15 wards; the latter are mostly small. There are no contrivances for ventilation, but perforated zinc panes in the windows and louvres over some of the doors. Open fires warm the wards. The bedsteads are of iron, without curtains, and have flock or hair mattresses. The nurses reside in the house. Nine medical officers attend to the patients.

Adelaide Hospital, Dublin,

Is for Protestant patients; has 99 beds, of which 40 are for males, 38 for females, and 21 for children. The building is five stories high; most of the wards are in the three upper floors. Windows are on one side only, the corridors on the other. Fever patients are in a separate house, which is small, and deficient in cubic space.

There are seven medical officers and a medical school connected with the institution; admission is by governors' letters.

City of Dublin Hospital

Is a small building, for 50 patients, originally a school-house, and therefore not without defects; there is however ample cubic space allotted to the patients. The arrangements for heating are on the usual plan, and so are the beds, windows, waterclosets.

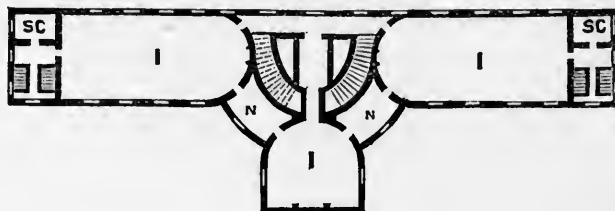
The House of Industry Hospitals.

Three hospitals, close together and under one management, contain nearly 300 beds, and receive all classes of diseases without letters and at any time. They afford ample means of instruction to numerous students and resident pupils. There is firstly—

The Hardwicke Fever House.—It is three stories high. Two large wards (I) for 17 beds are separated by a staircase. A

convalescent ward is built out at the back. The nurses' room (N) lies between the wards.

FIG. 36.

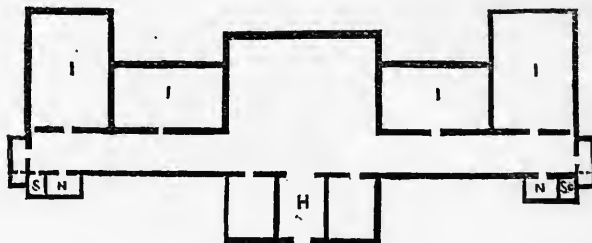


Front.

HARDWICKE FEVER HOSPITAL.—FIRST FLOOR.

2ndly. *The Whitworth Hospital* is a very regular building, and well arranged. The wards contain generally 10 beds; the water-closets are built out at the ends near the sculleries.

FIG. 37.



Front.

THE WHITWORTH HOSPITAL, DUBLIN.—GROUND FLOOR.

H. Hall.

Sc. Scullery.

N. Nurse.

3rdly. *Richmond Hospital*, originally a dwelling house; very defective, and long condemned as a hospital.

Jervis-street Hospital

Was originally a private house; it holds about sixty beds. The nursing is in the hands of Sisters of Charity. Ten medical officers attend.

Mater Misericordia Hospital

Was founded in 1861, by the Sisters of Mercy—a religious order; is situated north of Dublin, in ample grounds of its own.

The buildings surround a court, similar to the Rudolphstiftung,

200 feet long by 160, are three stories high, and large and lofty corridors, with fine arched roofs, run along the inside. They have large end windows, and numerous side windows, looking into the yard, with small windows opposite the latter communicating with the wards.

In the centre part of the front building and in front of the corridor we find the out-patients' department, on the ground floor; one small ward is at the back; two large wards for eight beds, and two cribs lie on each side of the centre, and there are two private wards at the further end adjoining them. The same arrangement exists on the first floor; but on the second two small wards are cut off at the inner end, in addition to those at the extremity. The large wards are 60 feet long, 17 wide, and 18 high, and afford 1800 cubic feet to each bed. In one corner is a bath enclosed by a wooden partition, in the other a cloth-press. The waterclosets are built out into the yard. The heating is by open fires.

The wards contained in the buildings at both sides of the yard are larger; they accommodate 28 patients each, and there are two of them on each floor. The corridor runs along the inner side facing the yard, and some portions projecting on the outer side and in the centre from the buildings serve for side wards, and the requisites.

The sisters and the chapel occupy the building which closes the court at the back; the latter might as well have been left open by disconnecting the residence of the sisters and the hospital. There was space enough for this arrangement.

The Meath Hospital

Lies in the country, to the south of Dublin. It has 112 beds, and three floors over a basement; the wards are mostly small, behind and in front of a corridor; none of them contain more than 10 beds. The windows have perforated zinc panes, and the ceilings ventilators. A celebrated school is attached to the hospital.

Mercer's Hospital

Is situated in the centre of Dublin, surrounded by a crowded neighbourhood. It contains 66 beds. The wards are irregular in shape; most of them open into corridors. Here we find wooden bedsteads, without curtains, straw mattresses, and in lieu of water-closets or privies only night-stools.

Stevens' Hospital.

It lies to the south-west of the town, somewhat low ; it contains 250 beds, if we include the fever-house. The buildings are erected round a square yard of moderate dimensions ; a spacious corridor runs along the inner side. The wards have opposite windows, which on one side open into the passage. There is ample cubic space for the patients on the ground-floor, where the ceiling is fifteen feet from the floor ; but in the second floor the height of the wards is only seven and a half feet, and the roof is sloping ; therefore the cubic space allotted to the patients is not sufficient. The bedsteads are of iron, and have straw mattresses, and in one ward (accident ward) the floor is tiled.

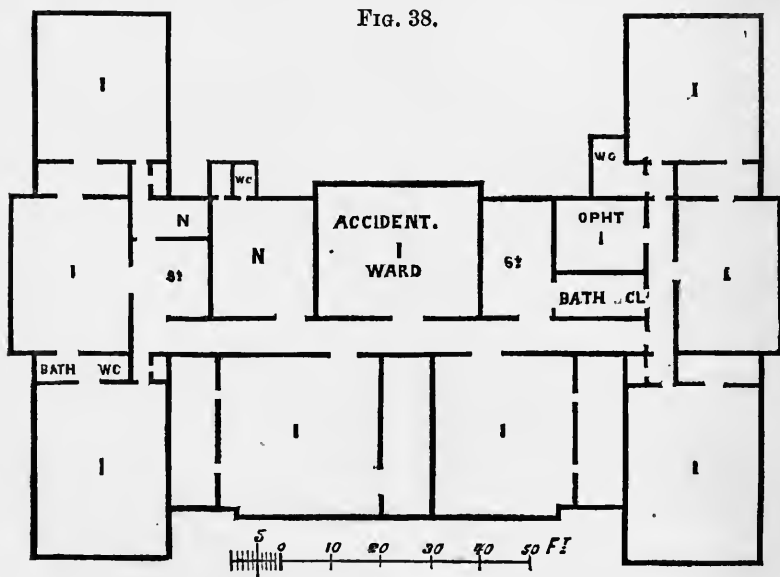
SCOTCH HOSPITALS.

They differ from English hospitals in reference to the regulations, which are more liberal, for admission. Besides the out-patients' department we usually find a district department, which sends a visiting medical officer to the sick poor ; his prescriptions are made up at the establishment.

Aberdeen Royal Infirmary.

A hospital for 229 beds, consisting of an old central part and two

FIG. 38.



Front.

ABERDEEN ROYAL INFIRMARY.—FIRST FLOOR.

new wings added to it, but it is generally half empty. There are separate fever wards: the waterclosets, with one exception, are well placed; originally they were in the centre of the building, and the drains run under it. For warming we find fireplaces.

Arbroath Infirmary,

Is a union infirmary for 60 beds, not quite up to the standard of modern requirements. Waterclosets without lobbies open into the wards on the female side; there is no resident medical officer, nor even dispenser; medicines are supplied by contract at so much a bottle. Two nurses reside in the house. There are perforated zinc plates in the upper part of the windows for admitting fresh air.

Dundee Infirmary,

Opened 13 years ago, it stands on a hill overlooking the Frith of Tay; and is built in horseshoe form: a corridor running along the inner side. It contains 170 beds in large and small wards; the largest have 26 beds each, placed between a pair of windows. They allow ample cubic space, about 1400 feet, to each patient. Fever, smallpox, and lock-wards are separate. There is no artificial heating or ventilation. It remains to be noticed that two resident medical officers died lately of typhoid fever at the hospital.

Edinburgh Royal Infirmary,

A general hospital for more than 500 beds, is situated in the town and partly surrounded by houses, but stands in four acres of ground.

We find 5 distinct buildings, constructed at different times. 1. The old infirmary. 2. The old surgical hospital. 3. The new surgical hospital. 4. The fever-house, formerly the College of Surgeons. 5. The lock-hospital. The wards are of various sizes and construction; some have opposite windows, but most have a corridor on one side and windows on the other. In some the top of the party-wall separating them from the passage has been taken down to improve the ventilation. Some of the smaller wards do not afford sufficient cubic space to the inmates. All are warmed by open fires, and many have outlets for the vitiated air.

Patients are admitted on most liberal principles; no disease is excluded. A celebrated medical school is connected with the hospital.

Glasgow Royal Infirmary,

The largest Scotch hospital, for more than 600 beds; it is badly

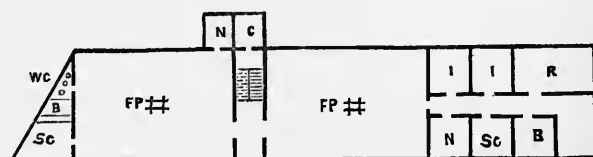
situated, but surrounded by ample grounds. It consists of three different parts, each five stories high, viz., the old infirmary, the fever-house, and the new surgical wards. Each section contains large wards having opposite windows, and smaller ones in addition. A peculiar feature is that the fireplaces are in the middle of the wards. Spring mattresses are in some parts of the hospital.

The old building has the form of the letter **└** reversed. Two large wards in a line are separated by stairs and offices, and the third part stands out at the back of the principal building. Small side wards and the usual appurtenances are at the ends.

The old fever-house has a central part and two wings standing in a line. In the wings are large wards for 20 beds; smaller side wards are in the centre.

The new surgical hospital, opened in 1861, is built on the modified block system. Two large wards are separated by the staircase; the usual side-rooms are at the further end; two fireplaces are in the middle of the large wards, back to back, and ventilating tubes ascend in the space between them. The cubic space allotted to each patient is ample. The closets (Jennings' patent) are as far away from the wards as possible.

FIG. 39.



GLASGOW SURGICAL HOSPITAL.—FIRST FLOOR.

B. Bath. C. Clerk. F. P. Fireplace.
N. Nurse. R. Day-room.

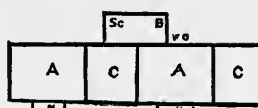
A special fever hospital has been opened recently. It consists of four separate pavilions, which are only one story high and contain two acute wards for 10 or 11 beds, and two convalescent wards, with baths, sculleries, nurses' rooms, and waterclosets built out at the sides. There are opposite windows and skylights. Convalescent patients can step into the garden without descending any steps.

The wards are heated partly by fireplaces, and partly by hot-water pipes running along the sides, they are ventilated by windows and skylights opened by rope and pulley, and by letting fresh air enter and pass over the pipes. The drains are all outside the buildings.

The resident officer lives in a separate house, and is superintendent of the whole, including the artificial ventilation.

There is only one class of nurses, and they watch at night in rotation, because it is thought important to have as good nursing at night as in the daytime, and not an inferior class of nurses for night duty. Great care is taken for supplying a proper diet to the patients.

FIG. 40.



GLASGOW NEW FEVER HOSPITAL.

- A. Acute ward.
- B. Bath.
- C. Convalescent ward.
- Sc. Scullery.
- N. Nurse.

The Greenock Hospital

Consists of the fever hospital, a regular block for 70 beds, and a general hospital for 50 beds, irregularly constructed. Both are perfectly divided the one from the other, although attached and standing in a line.

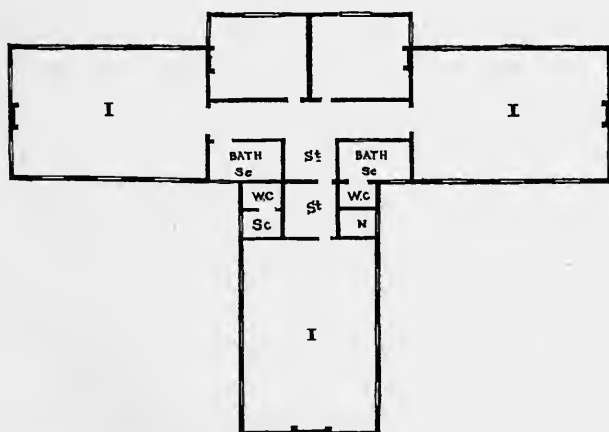
The cubic space is in some wards rather limited; open fireplaces are found for heating.

Montrose Royal Infirmary

Consists of a central portion and three wings, the former one floor higher than the latter. There are 52 beds; we find two large

FIG. 41.

Front.



MONTROSE ROYAL INFIRMARY.—FIRST FLOOR.

Sc. Scullery.

St. Stairs.

wards in the back wing and one in each of the other wings, containing 12 beds. The windows are opposite, and contain punched glass

panes ; there are ventilators in the ceilings and walls. Besides fire-places we find hot-water pipes which run round the wards.

Paisley Infirmary,

For 132 beds, is built in the form of a **T**. There are three floors and 11 wards, with opposite windows excepting where the wards are united to the central portion.

There is nothing to be noticed, but that the closets are not well placed, as they open into the wards.

FRENCH HOSPITALS.

The most remarkable establishments are found in the capital ; but those of the country are not without interest, especially the convalescent institutions. The Paris charities continue to be improved by the exertions of the central administration and its able director. As a striking difference in the arrangements of hospitals, I may mention that they contain a great many baths, 563 altogether, and they are used in some institutions by out-patients. Another peculiarity is the "*consultations gratuites*" at the hospitals, where advice is given but no medicines. Instead of dispensaries we find *bureaux de bienfaisance*, which are also under the central administration, but distinct from the hospitals. The *service à domicile* is connected with them and well regulated.

As means for medical education the Paris hospitals stand very high, and they offer a good opportunity to a large number of *internes* to enlarge their professional experiences at the bedside. Contrary to the uses in other countries, the *internes* are not permitted to obtain the licence to practise, "the *doctorat*." They have to give up their appointment first, and are consequently not allowed to practise as long as they reside in the hospitals.

The number of accouchements in hospitals is comparatively greater in Paris than in London, where more are confined at their homes.

It is intended to build ten new lunatic asylums on the pavilion plan, each to contain 500 or 600 inmates. They are to be composed of two pavilions for the insane two stories high, the dormitories to contain 16 beds, two pavilions for the quiet, two for the semi-quiet, one for feeble and one for agitated lunatics.

Bordeaux Hospital.

This was one of the first hospitals that was built on the pavilion plan, according to the principles laid down by the commission of the Paris Academy. The hospital is constructed on almost exactly

the same plan as the St. Jean Hospital of Brussels, only the buildings for administrative purposes are more confined; the pavilions are larger, and intended for a larger number of patients. In front we find the chapel and some offices. We enter a large square yard, surrounded by the gallery which connects the pavilions on the ground-floor. In a transverse building closing the yard opposite the entrance, we find the kitchen and dining-rooms. Two smaller square yards are behind this part. The dispensary is between them, and still farther behind are the operating theatre, the wash-house, coach-house, and post-mortem rooms, but all connected by the gallery.

The pavilions are five on each side; they have nine opposite windows on their longest sides, but the pavilions on the right side furthest removed from the entrance have only seven opposite windows. Nurses' rooms and a scullery are built out of the blocks near the passage, and baths, latrines, and side wards are arranged at the other end, just as in the Hospital St. Jean.

Paris Hospitals.

GENERAL HOSPITALS.

St. Antoine
Beaujon
La Charité
Cochin
Hôtel Dieu
Lariboisière
Necker
La Pitié

HOSPICES.

Bicêtre
La Salpêtrière
Incurables Hommes
Incurables Femmes.

SPECIAL HOSPITALS.

Les Cliniques
Enfants Malades
Sainte Eugénie
Fondation Bilgrain
St. Louis
La Lourcine
La Maison d'Accouchement

THE ANNEXES (in the country).

L'Hôpital Berk-sur-mer (Pas
de Calais)
L'Hôpital Forges-les-Bains
Le Vezinet
La Maison d'Issy } Hospices.

St. Antoine

Is situated in the suburb of the same name, and surrounded by large grounds and gardens. It was formerly a convent, and was opened in 1795 as a hospital. Two arms were added some years ago. It now contains 480 beds; 337 for medical, eighty-three only for surgical, fourteen for midwifery cases, sixteen for nurses, and thirty cribs.

The new wards have opposite windows, and contain twenty-four

beds. The latrines are not at the ends, but in the centre. Some of the wards are ventilated by a fan.

The hospital is generally overcrowded, and the corridors are used for wards.

Beaujon,

Consists of an old building, and four pavilions opened in 1844; they are connected by a gallery. The institution occupies a large piece of ground, separated by one street from the Parc de Monceau. The entrance is from the main road, but the buildings near it are occupied by offices.

The old and new wards are very different; the former have spinal walls, open at the ends; seven opposite windows; they are 60 feet long by 40 wide, and only 10 feet high; cubic space, 1500 feet. The new wards have the same length and breadth, but are 15 feet high; the cubic space is 1800 feet. They are greatly superior to the older wards. A room for two beds adjoins them near the staircase, and the conveniences are at the other end. The chapel is at the back.

FIG. 42.



NEW WARD OF BEAUJON
HOSPITAL, PARIS.

A. Scullery (W. C. opposite).

B. Separation room.

C. Corridor.

The system of heating and ventilation is that of Van Hecke; the air is injected by the action of a fan with two blades, and in winter-time passes over coils of heated pipes, placed in an air-chamber, before it enters the wards. The foul air finds its way out by apertures near the ceiling; the waterclosets are warmed.

Bicêtre.

This is a large almshouse, founded in 1656, for aged, infirm, and insane males. The building is an old château in the country, of large size, but not so large as the Salpêtrière; the number of inmates is also much less. There were some years ago about 3000, but they are now reduced to 2000. An infirmary is attached to the institution, and a library and servants' school has been lately added.

The buildings stand around nine yards, mostly square, and the most recently constructed are worth a visit. The Prison de Bicêtre, which stood inside the enclosure, was removed about 1836.

Charité,

Has a less favourable site than most Paris hospitals; it is in the centre of a busy neighbourhood. It was founded in 1637,

but enlarged at different times. It contains at present more than 400 beds. The buildings surround two square yards, and one arm branches off at the back. Part of the hospital was in course of reconstruction at the time of my last visit.

Les Cliniques

Is a hospital for 152 beds, in the Quartier Latin. It serves, as the name implies, for clinical instruction. The building was formerly a convent, and re-opened as a hospital in the year 1834. It has tiled floors, and there are other objectionable arrangements. The wards are frequently overcrowded.

The beds are divided between surgical and midwifery cases; for the former there are 61, for the latter 54; and there are 37 cribs. There are six lying-in wards.

Hôpital Cochin,

One of the smallest hospitals in Paris, containing only 119 beds, was founded in 1780 by a clergyman of the same name. It is built on the corridor plan: the corridor has two large wards in front for 17 beds each, and two small ones for six beds are built out at the back. The stairs are in the centre, and at both ends; the waterclosets are badly placed in the corridor. The chapel is opposite the front entrance. Nurses' rooms are partitioned off from the wards.

A new "Maternité" is connected with the hospital Cochin. The wards contain ten beds for females who have been confined, and a crib to each. The cubic space allotted to them is very ample. The wards have opposite windows; there are only two wards on one floor, and a staircase is interposed between them. They are warmed by open firegrates placed opposite the entrance, and by tubes, which pass from a calorifère in the basement straight up, and through the wards to the ceilings.

Hôtel Dieu.

This hospital is in course of reconstruction, and it is intended to erect, in the place of a most defective building, one which will surpass all the others by its improved and splendid arrangements.

It will contain 716 beds; there will be 18 wards for 26 to 30 beds, 19 for 6 and 10 respectively, 3 for 6 and 12 respectively, and 44 for one or two beds.

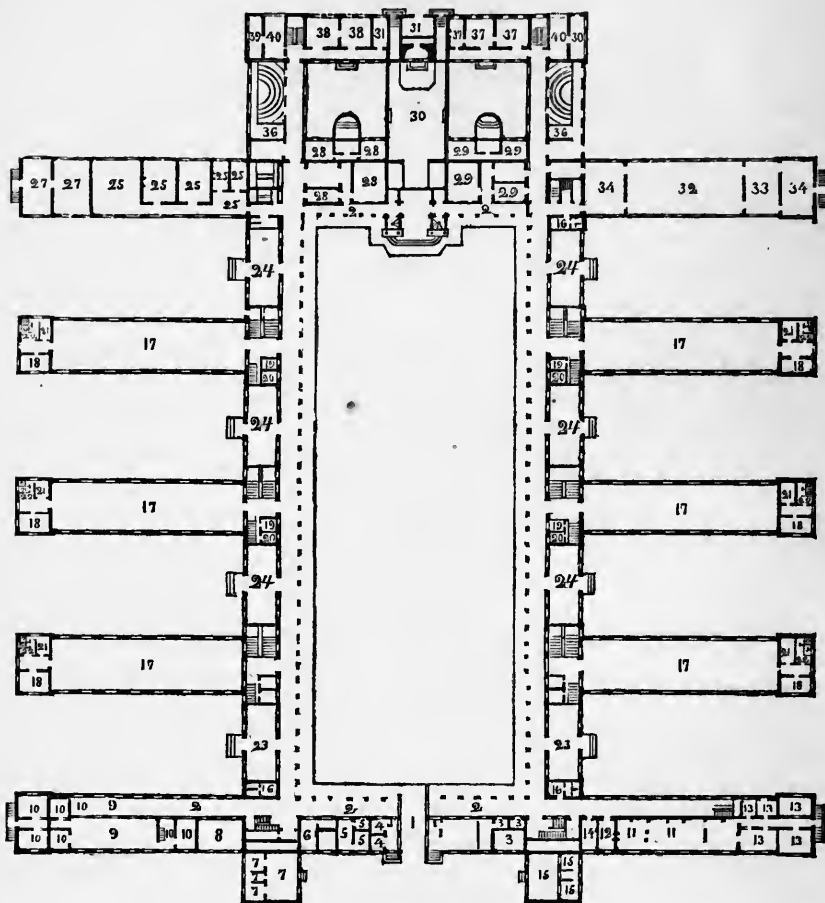
The windows will have compartments revolving inwards.

Hospital Lariboisière.

The site of this hospital is in a northern suburb of Paris, not far

from the Northern Railway station. The building consists of a number of pavilions three stories high, connected by passages, 2, which are only about ten feet high, and the roof of which serves for promenades.

FIG. 43.



Front.

HOSPITAL LARIBOISIÈRE.—GROUND FLOOR.

There are six pavilions on each side of a large yard (whose axis is nearly from north to south); there is a small entrance yard and two smaller yards at the back, where we find the chapel. Passing the entrance, 1, and porter's lodge, 4, we find to the right the directors' rooms, 3, to the left those of the *éconôme*. No. 6 is

destined for the medical officer of the day ; No. 7 for out-patients ; 8, dining-room for officers ; 9, kitchen. This is a large room, about 50 feet by 20, and has two very large ranges and several smaller ones. In one of the former we find eight large cast-iron steamers in the upper part of the stove for cooking soup, or *bouillon*. A separate fireplace for roasting is heated by wood. Near the kitchen are the store-rooms and sculleries, 10.

The rooms in the first floor over 7, 8, 9, 10, are used by the steward and officers ; and in the second floor there are bed-rooms for the officials.

No. 11 is the dispensing department, well lighted and airy ; contains six large tables, covered with metal. The cabinet of the head dispenser is at one end, so that he overlooks the whole room. On the other side, 13, are stores and other requisites of a dispensary ; 15 is the committee-room for medical officers and the lavatories. In the first floor over 11, 12, 13, 14, 15, are directors' rooms, head and sub dispensers, and resident medical officers ; 16 is the closets.

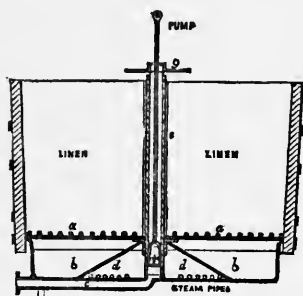
The three nearest pavilions are for patients, the males on the right, females on the left. Each floor contains a nurse's room, 19 ; scullery, 20 ; a large ward, 17, for thirty-two beds ; and a small one for two, 18 ; the latrines are at the further end, 22. There are no waterclosets, but water is thrown down the drain from time to time ; there is an iron rail in place of the seat. Close by is the foul-linen room, 21. The large wards are 115 feet long, 26 wide, and 16 feet high ; cubic space for a patient, 52 metres, nearly 1900 cubic feet. The walls are coated with Parian cement, light green and polished ; the floor is wainscot (parquet) ; it consists of sexagonal oak blocks glued together, beeswaxed, and polished. Sixteen windows, eight on each side, give ample light ; they almost reach from the floor to the ceiling, being about 11 feet high. The beds stand in double rows, two between two windows, the sides against each other, but leaving a space between of more than 10 feet. The bedsteads are of iron, and have spring mattresses and white curtains ; the window-curtains are also white.

Between the first and second pavilion is a library for patients, 23 ; between the others, convalescent-rooms, 24, some of them now used as wards ; 25 are sisters' rooms, 26 their staircase ; 27, stores ; over 25, 26, and 27 are sisters' rooms on both floors ; 28, baths for females ; 29, for males ; 30, chapel ; 31, vestry ; 32, wash-house ; 33, drying-oven ; 34, for ironing. Over-head are rooms for stacking the clean linen and sleeping-rooms for servants ; 35, operating theatre ; 36, surgeon's room ; 37, dead-house and post-mortem rooms ; 38, common dressing-room for all the patients ; 39, stables ; 40, coach-house.

Wash-house.—A sister is at the head. All washing is sorted by the sisters; that of contagious patients is removed from the wards to a separate place; also very dirty linen is not washed with the other, as it is subjected to a higher temperature in separate tubs.

The following is the process :—The things to be washed are soaked in cold water, they then come under the action of hot ley; they are afterwards washed with hot water and soap, then rinsed, pressed, and dried.

FIG. 44.

TUB IN THE WASH-HOUSE OF
LARIBOISIÈRE.

The washing-pan and four tubs are in a large room, 18 feet high. The tubs are of wood, 6 feet wide, 4 feet high, and divided in two parts by a perforated board (*a*), the lower part (*bb*) contains the hot ley, the surface of which is 4 inches from the board; on the latter the cloth is placed. The hot ley is heated by the steam pipes (*dd*) to 212 degrees; it is pumped upwards in the centre by the pump (*e*), and thrown against the cover (*g*) of the tub, from which it falls on the cloth,

through which it percolates, and the proceeding is repeated; (*c*) is a hot-water pipe.

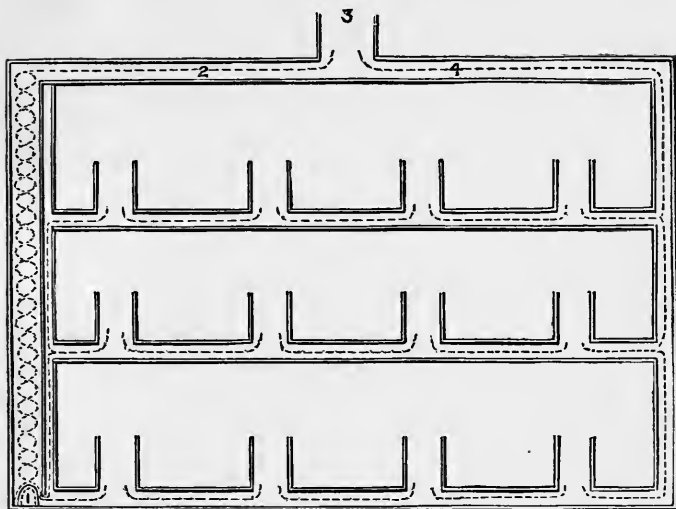
The stone pan in the centre of the room is 39 feet long, 18 feet wide, and has four compartments, the largest one for cold water, two smaller for hot water, one being for the linen of contagious patients, and one for hot water and soap; round this the washerwomen, twenty-five in number, stand, each in a wooden chair or stall.

The washed cloth is wheeled on little carriages into the yard or drying-rooms (*séchoirs*). In the latter the drying is effected by hot air, which ascends through chinks from below.

Warming and Ventilation.—We find two systems of heating and ventilation in Lariboisière. On the female side the Léon-Duvoir system is in use. The water is heated in the boiler, 1 (Fig. 45), and expanding, rises upward. The pipes, 2, take it to a tank or reservoir, 3, from which it finds its way, 4, to the several floors and back to the boiler. On each floor the water pipes pass through four stoves.

The ventilation is caused by the heat of the reservoir, 3, to which all the foul-air channels lead. The reservoir, containing several divisions, forms a large surface, from which heat is thrown out.

FIG. 45.



WARMING IN THE HOSPITAL LARIBOISIÈRE.

The foul air ascends through the channels formed by these divisions, and ultimately escapes by a chimney. Fresh air continually replaces the impure, being admitted through channels which end in the outer walls and communicate with the stoves. As these are warmed in winter time, the pure air gets heated before it enters the ward. A patient is said to receive 20 cubic metres of pure air per hour. If it is wished to admit the air unwarmed, the water is shut off from the stoves.

The following is the second system, the *système Grouvelle-Thomas-Laurence*. There are four stoves filled with water in each ward; this water is heated by steam pipes from a boiler in the cellar, each pavilion having its own boiler.

The ventilation is by forcing in, or injecting the air. An air-shaft, higher than the chapel, communicates with a cellar, where a fan is placed. This fan or ventilator has four wings or blades, bent to an angle, and revolves very quickly, viz., 400 times a minute; it is set in motion by steam power. It draws the air from the shaft and forces or injects it into a channel which takes it to the wards. The air passes through the stoves in the wards, and from their forty-eight apertures and some openings in the flooring it moves up to the ceiling with a considerable force, and replaces the foul air at the ceiling, which finds its way out through apertures near the floor.

The smaller rooms for two beds have a separate stove. Each patient is said to receive 60 cubic metres of fresh air per hour. With regard to this, however, it might be urged that the patients do not breathe this pure air before it is more or less mixed with that of the ward.

If it is necessary to ventilate without heating, the steam is shut off from the stoves and pipes.

Remarks on the Systems of Warming and Ventilating in Lariboisière.—As regards the warming, both systems are satisfactory. The wards can be heated to a temperature of 62 degrees, and higher if required. Duvoir's system is extremely simple, easy to regulate and to superintend, as it requires only one man who has to look after the fire under the boiler. The temperature may be increased rapidly and without difficulty. The stoves keep warm for a long time, as great quantities of hot fluid circulate. The other system also answers well; I think an escape of steam happened once. Repairs are certainly rare. The air is not dry generally, but its humidity has sometimes to be augmented by wetting the fans.

These artificial systems of ventilation are objected to on the ground of unhealthiness. It is said, that not only is the air less sweet than where doors and windows are solely relied upon, but that people die faster and operations are less successful than elsewhere.

Now to accuse the ventilation for all this, is not quite fair. First, windows and doors are certainly used to a considerable extent in Lariboisière. Duvoir especially employs no other means in summer during the day; and in the wards on the male side the windows are not so rigidly closed as is represented elsewhere.

As regards the death-rate, it is admitted that no circumstance influences it more than the regulations for admission. Where admission is free, the mortality is always higher than where it is limited.

In Lariboisière, nearly one-third of the patients are tuberculous; a great many clinical cases are admitted, and the number of light cases is small. It is necessary to mention these facts, in order to explain that Lariboisière has nearly the highest death-rate of the Paris hospitals. It could not be compared in this respect with the London charities; but if compared with Vienna, its death-rate would be found considerably less.

On the other hand, no one can deny that the expectations have not been fulfilled which were based on theoretical calculations, and that the enormous costs of construction are not repaid by corresponding tangible advantages.

The existing means for ventilation, if not relied upon exclusively, may certainly be used with great benefit in the hospital.

Administration.

One director lives in the house; one *économé*; six officials connected with the bureau; sixteen male and nine female servants; besides the *aumoniers* and *religieuses*. There are six physicians and two surgeons, who receive 1500 fr. each; twelve *internes* (receiving 600 or 400 fr. according to time of service); one head dispenser (2700 fr.), and eight assistants (600 or 400 fr.)

The physicians visit their wards each day at eight o'clock.

The annual expenses for each bed are 911 fr.; the average cost of a patient per day $2\frac{1}{2}$ fr.; the mortality 1 in 7·98 (after Gallard).

The laundry undertakes the washing for two other institutions besides Lariboisière.

A school of medicine is connected with the hospital.

Lock Hospitals.

La Lourcine is the female lock hospital, opened in 1836, it contains 216 beds, 20 of which are for midwifery cases. It cannot be visited without special permission.

Midi (l'Hôpital du) contains 336 beds, it is a special hospital for venereous diseases, males only. It is built around several square wards, and offers nothing worth notice as regards construction. It was brought into notice by Ricord, whose open-air lectures were held there. Some of the patients make small weekly payments.

St. Louis.

An immense building, one floor high. It consists of many blocks, which stand around square yards.

Its origin dates from the time of the great plague, when 68,000 people died of it in one year at the Hôtel Dieu (1606). It was constructed and opened during the reign of Henri IV., and bears the name of King Louis, who died of the plague. It was not opened before 1612, and serves now for the reception of contagious and skin diseases, including itch, struma, tinea, &c. It contains 810 beds—viz., 605 for medical, 156 for surgical, 32 for midwifery cases, and 18 cribs.

The wards are of great length, having but few windows. These are opposite to each other, six or seven on each side. There are square wards in the corners of the quadrangles; they contain 9 beds, but the large wards have from 37 to 39. The wards open into each other, as there are no corridors. I found floors of red brick,

but this may be changed now. The ceilings are very high (on Italian models), and arched. In some of the large wards wooden partitions are found, ten feet high. The wards are warmed by three stoves or calorifères; open firegrates were formerly used in the square wards; but they are bricked up. The blocks, with few exceptions, are only one story high.

Of all the arrangements, the baths are the most interesting to a medical visitor. They were founded in 1816, and recently improved. They are not only used by the in-patients, but also by out-patients. 1200 to 1500 baths can be given daily. All kinds of medicated and vapour baths are found, and hot plates for warming the linen, and linen shoots. Various apparatus are used for hydrotherapeutic purposes. A great many persons visit the baths at one time, and strict order is kept by the officials.

L'Hôpital Necker

Adjoins the Rue de Sèvres, and contains 386 beds; is built in the form of a quadrangle, partly open at one side; but the ends of the wings are connected by a gallery on the ground-floor. The buildings have three floors. There are wards for 20 and for six beds each; the windows are opposite in the former. The attendants' room is between the larger wards; water-closets and baths are built out at the ends of the wings. The number of baths is 12.

The system of heating and ventilation is the same as at Beaujon.

La Pitié.

The building dates from the year 1612; it can accommodate 612 patients, there being 403 beds for medical cases, 168 for surgical ones, 31 for women to be confined, and 18 cribs.

La Salpêtrière

Is a large almshouse in Paris for females, including lunatics. There are forty-five different buildings, which have 4682 windows, and stand mostly around rectangular courts. As Tenon mentions, there were once 8000 inmates at one time, but this number is reduced at present to about 3000. The actual number on July 1, 1862, was 2635 epileptics and idiots; 1513 lunatics; 109 waiting to be sent elsewhere; 778 servants and officials; the total number being 5035 persons. At present there are 16 medical officers, and 23 dispensers; 553 officials, 120 journeymen-workmen, 1 director, 1 steward.

A large laundry is attached to the Salpêtrière; it does, or did till lately, the washing for five other institutions—Hôtel Dieu, Beaujon,

Charité, Les Cliniques, and La Boulangerie. The inmates are divided into different sections.

The infirmary of the Salpêtrière contains 300 beds, and was at one time celebrated as a school for the science of mental diseases.

Hospitals for Children.

Three hospitals for children exist in Paris.

The hospital Ste. Eugénie was opened in 1853, and bears the name in honour to its patroness, the Empress. It is situated in the Rue Charenton, Faubourg St. Antoine, and has beautiful grounds.

It contains 405 beds; 305 for medical, and 100 for surgical cases. Particular care is bestowed on the baths.

Les Enfants Malades, instituted 1802, for 600 children, only 98 beds being reserved for surgical cases; has been subjected to severe criticism by different authors as an unhealthy hospital.

Fondation Bilgrain, Rue de Sèvres, for 160 children, is built on improved principles; two large pavilions, which have windows on each side, are connected by a centre building containing bath-rooms.

It was opened 1858, and bears the name of the founder, who left 6000*l.* for its construction.

Two annexes, or country hospitals, are in close connexion with these establishments. They are, first, the Hôpital Berk-sur-Mer (Pas de Calais). It is composed of two long pavilions, two floors high, having opposite windows (fifteen on each side); they stand in parallel lines, are connected by galleries, and the chapel is in the centre. The buildings are close to the beach. Scrofulous children are received.

The other is l'Hôpital Forges-les-Bains, consisting of two principal pavilions connected by a centre building. The establishment is in the country, about twenty-four miles from Paris. Each contains about 100 beds.

FRENCH MILITARY HOSPITALS.

Bayonne

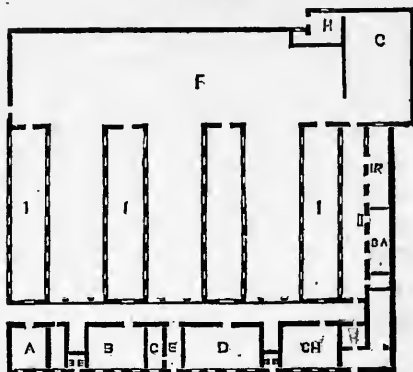
Has a hospital for 950 patients; it is open since 1844. It consists of five large pavilions ranged around a rectangular yard. The pavilions, which are situated on each side of the entrance, have two floors, the others three. The outbuildings, chapel, dead-house, vapour-baths, and engine-room, lie at the back.

The principal wards are large, for 116 patients, and the beds stand in *four* rows. The cubic space for each patient would be less than 900 feet if the wards were full, but they seldom are.

Military Hospital, Philippeville (Algeria).

It was constructed in 1840 on a healthy and elevated site, on the pavilion plan. There is room for 550 patients. As seen by the woodcut, there are five blocks, all connected on one side by a long building, having galleries on the side facing the pavilions.

FIG. 46.



Front.

On the scale of $\frac{1}{84}$ of an inch to a foot.

HOSPITAL, PHILIPPEVILLE (ALGERIA).—GROUND FLOOR.

- | | | |
|----------------|---------------|----------------------|
| A. Dispensary. | E. Entrance. | H. Post-mortem room. |
| B. Kitchen. | Ch. Chapel. | B. A. Common baths. |
| C. Porter. | F. Promenade. | I. R. Day-room. |
| D. Offices. | G. Stores. | |

Military Hospital, Sidi-bel Abbas (Algeria).

It was opened a few years since, is built in horse-shoe form, and can hold 225 patients. There are large and small wards. One peculiarity is a gallery running along on the ground-floor on the inner side. It serves as a promenade, and connects the wards.

L'Hôpital du Val de Grâce, the largest Military Hospital in Paris.

Part of it was opened for the reception of patients in 1814; three new blocks were added in 1838. They have this similarity to the Vincennes hospital, that they are divided into two equal portions by a central staircase. The latrines are arranged on a novel plan, being in small detached pavilions, approached by open galleries from the main buildings.

The Vincennes Military Hospital

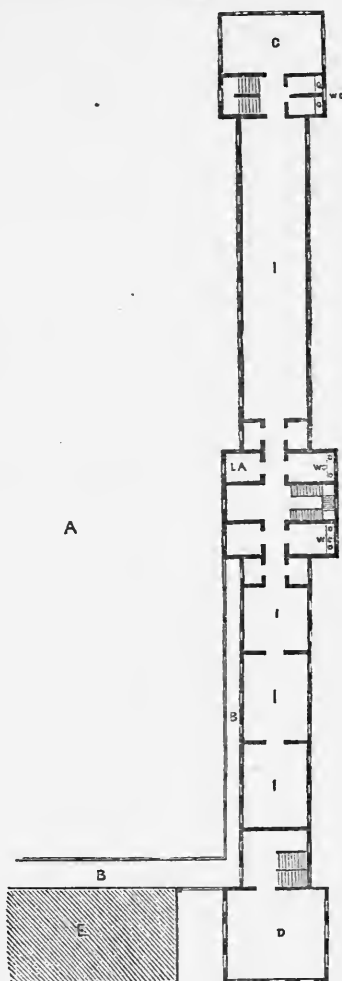
Is a recent building. It was partly opened in 1859, and is con-

sidered by Dr. Larrey as almost a model hospital. It can accommodate 366 patients, including twenty-one officers. Its site is excellent. Although in close proximity to Paris, it stands in a pleasant part of the country, and opposite a beautiful park, the Parc de Vincennes. It is near the main road, but separated from it by a large yard, which is laid out with shrubs and walks.

It mainly consists of two pavilions of considerable dimensions; they stand parallel, their ends looking towards the road, and are connected by a glazed passage, which runs parallel to the road. The wards are of considerable length, and for forty patients, but some are divided by transverse partitions into two or three smaller ones communicating with each other. Each block contains an airy staircase in the centre. A different system of warming is in use in each. In one block there are stoves containing water, which can be heated by steam pipes. The wards on this side are ventilated by fires. The foul air of the lower floors is extracted by the downward draught of the fire which heats the boiler in the engine-house, but the vitiated air of the third floor is extracted by a fire in the upper part of the building. In the other block we find calorifères heated from the basement. There are no means for ventilation but the mantel of the calorifères, and one of the smoke shafts of the calorifères is used for extracting some of the foul air.

The surgical cases are on the ground-floor, the medical on the first and second, and the syphilitic on

FIG. 47.



On the scale of $\frac{1}{84}$ of an inch to a foot.

Front.

VINCENNES MILITARY HOSPITAL.—
RIGHT-HAND BLOCK.

- A. Court.
- B. Covered gallery.
- C. Non-commissioned officers.
- D. Communauté.
- E. Administration.
- LA. Lavatories.
- I. Wards.

the third floor. Non-commissioned officers are accommodated in the square room. It contains twelve beds on the three lower, and ten on the top floor. A few officers' rooms are on each floor; lavatory and waterclosets are near the staircase.

The orderlies (120 in number) are in separate barracks; the wash-house is detached, but the kitchen is on the ground-floor. This is one of the objectionable arrangements. There are, however, only a few patients on the ground-floor—viz., eye cases, and some officers.

MILITARY-NAVAL HOSPITALS.

There are some large military-naval hospitals in France; at Rochefort, St. Mandrier, near Toulon, and at Brest. The Rochefort hospital is composed of pavilions connected by galleries. It can receive 800 or 900 patients, but usually has not more than 600. The pavilions have two floors, and wards for sixty beds. The first-floor wards are constructed like attics, and the cubic space for patients is, therefore, limited. Modern improvements have been lately introduced.

There is a school of medicine connected with the hospital, and the clinical wards are attached in a somewhat novel manner to the other wards; there is separate access to them.

Toulon Naval Hospital

Is an old and large hospital; it can find room for 1300 patients. It contains large wards for thirty-two beds, and affords 1200 cubic feet to each inmate. It is so arranged that the corridors run on both sides of a ward, and also along the ends, similar to the double Indian verandahs. The climate being very hot, this seems excusable, but no modern hospital (at least in Europe) should be built on this plan.

APPENDIX.

Other Institutions which are under the General Administration.

In addition to the "Hospices proprement dits," mentioned on page 76, there exist some special institutions of a similar character. The "Hospices Fondés" are almshouses founded by private persons, and with peculiar regulations.

I. HOSPICES FONDÉS.

1. Fondation Boulard.

It is destined to accommodate twelve or thirteen aged males who

formerly belonged to a better class of society, and is situated at Saint Michel (suburb of Paris).

2. *Fondation Brézin.*

It contains 316 beds, sixteen standing in the sick wards. It was founded by the proprietor of a large foundry, who died about twenty years ago, and is intended for poor artisans aged above sixty years, especially brass-founders, locksmiths, &c. It is situated in the country (département Seine et Oise).

3. *Fondation Devillas,*

For working men, aged sixty years or more, containing thirty-five beds. It is situated in Paris.

II. MAISONS DE RETRAITE.

These establishments serve as a retreat to those of the poorer classes who are not quite denuded of all means.

1. *Les Ménages* (Rue de la Chaise),

Contains 821 beds, the infirmary thirty-one. Married couples or widows are admitted; the former pay 128*l.* on admission. They receive board and lodging and small sums of money (seven shillings a month). They must be aged sixty years or more.

2. *La Rochefoucauld,*

Situated in a suburb, contains 246 beds, twenty in the infirmary; is intended for poor officers in the army, impoverished clergymen, or clerks.

3. *Sainte Périne,*

At Anteuil, contains 293 beds; the infirmary can accommodate 20 persons. It is intended for aged couples.

III. MAISON MUNICIPALE DE SANTÉ.

This is a hospital for paying patients. The number of beds is 300, and the payment varies from four francs to fifteen per head per day, according to accommodation. Those who pay the latter sum have a bed and sitting-room for themselves.

GERMAN HOSPITALS.

Many of them are of great extent and ancient origin, and celebrated for the medical schools connected with them. But, as regards construction, many are defective. The pavilion system is rarely

adopted, but as a leading feature, we find the corridor with the wards opening into it. Paying patients are admitted into the charities side by side with those for whom the municipality pays. Admission is, generally speaking, free, but the patients must be provided with medical certificates, which the medical officers for the poor generally supply. The hospitals are usually managed by a director, who is responsible to a government or municipal board, and frequently assisted by a medical committee.

Lunatic asylums exist in large numbers, but are, with some exceptions, not in connexion with hospitals. Almost every system of nursing is found in the various charities. Dispensaries are not connected with the hospitals (the Jews' hospital in Berlin excepted), but with the universities; or they are free, and private institutions.

Augsburger Allgemeines Krankenhaus. (Augsburg Hospital.)

I mention this hospital, although I do not know much about it, on account of its absurd management. It is of recent origin, warmed artificially (by Haag's water stoves), and contains many modern improvements. A benefactor left a large legacy for building it, and it could be constructed and furnished with some luxury. But as Protestants and Catholics were both destined to receive its benefits, and as they did not agree, it was after warm debates determined to have the Catholic and Protestant patients on separate sides of the hospital, and each part separately managed; so that there are two kitchens, two dispensaries, &c., everything in duplicate; by which arrangement much unnecessary expense is caused.

BERLIN HOSPITALS.

Bethanien Hospital

Was founded in 1847, by the late King. It is built on the corridor plan, and has a centre building and two wings. It is situated on an elevated site, and surrounded by extensive grounds, and has a very striking and imposing exterior. It does not contain more than 300 or 350 patients.

There are three floors over a basement. The wards, which are not large, contain 10 or 14 beds, but there are also separation-rooms. The windows are on one side only, and opposite the door. (See Fig. 1, No. 4.) The wards allow 2000 cubic feet or more to each patient. Spacious corridors run round the whole of the inner side. Nurses' rooms and sculleries are between the wards, and hot and cold water is distributed over the different parts from the reservoirs. The waterclosets are near the corridors. The convalescent-rooms

are in the centre, and a large balcony adjoining the children's ward allows all of them who are able to leave their beds to enjoy the open air during the day.

The bedsteads are of iron, and have a foot-board ; some have curtains and feather beds.

The corridors are warmed in winter by steam, the wards by tiled stoves which stand in the middle. A singular plan of ventilation was tried, but failed. We notice green-coloured iron columns standing in the wards ; they consist of two tubes, one in the other. The smoke of the stove passes through a pipe into the inner tube, which by this gets warm ; the outer tube has 13 apertures at its base, into which the foul air is expected to enter and rise by the heat of the inner tube. These apertures can be closed. Fresh air is admitted so that it passes through the stove up to the ceiling. It was found that the effect was very slight.

The engine-rooms and kitchen are placed in the main building. Steam is used for cooking. An ice-pit and dead-house are separate and at some distance.

The following is the system of admission :—The patients generally have to pay, and there are two classes ; one class pays three shillings per day, the other half as much, but sometimes they are admitted free.

The hospital is a general one for all diseases, but sometimes certain maladies are excluded for a time to prevent the outbreak of hospital diseases. The administration is peculiar : it is in the hands of a Protestant order. The pious sisters, called Diakonissinnen, attend to the nursing and dispensing, and occupy a considerable portion of the building. They keep a school where the novices are trained, and attend to the cooking and diet. The head sister lives in the hospital, and a committee meets from time to time to assist her in managing the hospital. A clergyman, a physician, and some other gentlemen form the committee.

The Diakonissinnen engage themselves to attend to their duties as nurses for five years, after which time they may retire, but they may leave sooner, especially if they marry, but then they have to give a certain notice.

Catholic Hospital, Berlin.—Katholisches (Hedwigs) Krankenhaus.

This institution is situated in a crowded part of the town, Hamburgerstrasse, and has grounds of somewhat moderate extent attached to it. It consists of a centre building in front and wings extending from the sides backwards. It is three floors high, and holds about 350 beds. It is built on the corridor plan, and the wards are small,

for two to seven patients each. They have windows on one side only ; the door leading into the corridor is opposite.

We find the nurses' rooms interposed between the wards in a similar manner to that in the Bethanien. Water is laid on to all the floors and waterclosets, but there are no lavatories.

The corridors are warmed by steam, the wards by stoves, and there is a system of ventilation by a central shaft leading to the roof, near which a ventilating fire is kept. But the effect is very limited.

The hospital is supported by voluntary contributions, and managed by the sisters of St. Charles Borromeus, whose head-quarters are at Nancy, in a similar way as the Bethanien. Some of the patients pay the same amount as at Bethanien (one thaler or half a thaler).

Charité Hospital, Berlin.

This hospital consists of an old structure, to which several additions have been made. The buildings are situated near the river Spree, surrounded by large grounds, and some distance from any habitations. They contain from 1000 to 1400 patients. We find the principal and older portion built on the corridor plan in the form of an open square, enclosing a large yard or garden, planted with trees and shrubs. There are three floors ; the centre building contains on the ground-floor the dwelling-rooms of both directors, on each side of a spacious hall, and their offices. On the first floor, which is about 14 feet high, we find surgical cases, the males on one side and the females on the other ; there are two large eye wards, clinical wards, and an operating theatre. On the second floor we find the medical clinical wards. The floors are lacquered and oiled, the windows *croisées* ; the beds have flock or horsehair mattresses, and stand four or five feet apart. In the wings the ground-floor is mostly occupied by medical officers and the rooms of the officials, the two other floors by wards some larger, but most of them have not room for more than six or eight patients. They are connected by the corridor, but mostly open into each other. The attendants' rooms are interposed between two wards.

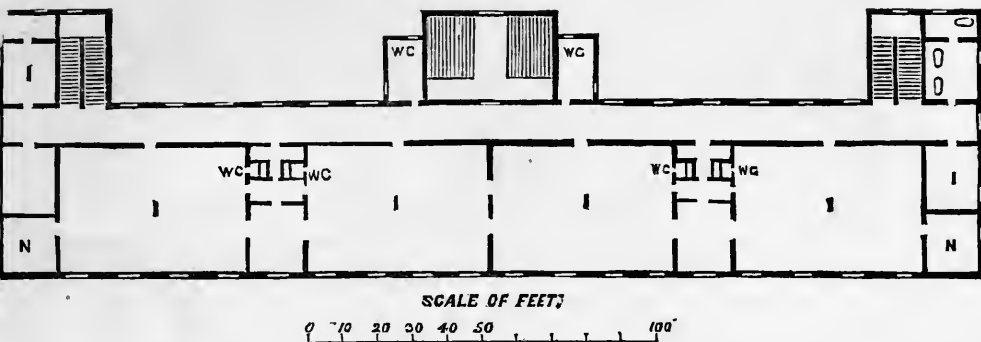
Midwifery wards, containing 80 beds, are in a separate block which was formerly used for small-pox patients. It is at some distance from the other parts. It is not used in summer time, as the patients are transferred to the summer lazareth.

A new kitchen was built some years ago, and attached to one of the wings of the old Charité ; it has three ranges, one for the patients, the second for officials, the third for medical officers.

The wash-house is separate. It contains the usual implements,

including an hydraulic press. The linen can be dried by hot air in the two upper floors.

FIG. 48.



SUMMER LAZARETH OF THE BERLIN CHARITÉ HOSPITAL.—FIRST FLOOR.

Summer Lazareth.

This building is situated near the oldest part, but stands perfectly free. It is one block 280 feet long, 51 deep, with portions projecting 25 feet from the centre and from both ends. There are only two floors over a cellar. The engine-room is in one of the projecting parts; it is, however, divided from the main building by the corridor, so that this arrangement is less objectionable than under other circumstances. Several rooms in the cellar, which is partly underground, are used to live in; this is an arrangement which would be objected to in this country. On the first and second floor are four wards, two for males and two for females, 56 feet long, 36 wide, and 16 high, communicating with each other. They allow a cubic space of about 1800 feet to each patient when full. They are kept empty during winter time. The walls are stuccoed; the windows high, but on one side only. On the other we find the corridor (nine feet wide) lighted by 12 windows and two end windows. The projecting centre contains the spacious entrance hall on the ground-floor, and the operating theatre on the first; besides some well-placed waterclosets. The nurses' or attendants' rooms are interposed between the wards, and can be entered from them. The tea kitchens (sculleries) are arranged on a similar plan, but spaces for the waterclosets are cut out of them, and these open into the wards through a small lobby. This arrangement is convenient for the patients, as they do not have to pass through the corridor, but makes it necessary to pass the drains under a part of the building.

There are no means for heating or ventilation, but in the bath-rooms there are apertures which open into the smoke shaft.

The Dead-house is situated opposite the summer lazareth on elevated ground ; it is 95 feet long and 34 deep, consists of a ground and two other floors over a high basement. There are two principal and four or five side entrances in basement and ground-floor. They are well arranged, and serve for conveying in or removing corpses, and admitting visitors and mourners, the students connected with the anatomical school, the lecturers, the medical men, and others attending an inquest. The basement contains a room where the dead are exposed (morgue), another where the *post-mortems* are made at an inquest, and side rooms for washing, medical officer, &c. From the basement the corpse can be conveyed into an ice-cellar. We also find a kitchen belonging to the chemical laboratory. The floor is impervious. On the ground-floor we find three dissection rooms for students and clinical professor, and the private rooms of the latter and his assistant. There is a large amphitheatre, with a table with a moveable top in the centre.

On the first floor we find large rooms used for microscopical instructions, and any one who attended Virchow's lectures must remember the tables with tramways on which the microscopes are moved. In addition there is a chemical laboratory. On the second floor is an anatomico-pathological museum.

As regards the construction of the tables on which the dead are placed, they have borders, so that fluids cannot run off them, but are drained off through small holes. Water may be sprinkled over the dead bodies from jets.

The New Charité (Neue Charité)

Is an old building, three floors high, built in the horseshoe form ; it is surrounded with and completely divided from the other parts by a high wall, and contains at times more than 500 inmates, including lunatics, syphilitic and prisoner-patients. The impropriety of such an arrangement has long been felt.

The lunatic establishment contains large and small wards and cells ; the latter have wooden walls, and are somewhat dark. The asylum is used for clinical instruction. It will be shortly removed to a separate building.

The administration of the whole is in the hands of two directors, one called the medical, the other the economical director ; both under the same government board. Besides the numerous medical officers living in the house, clinical professors visit the wards and give lectures, which include children's diseases and midwifery.

The nursing is principally in the hands of married couples. They are under inspectors ; the latter have to superintend a certain number of wards and constantly to report to the directors, especially the economical one. A strict system of reporting is insisted upon, and perhaps a little overdone.

Jews' Hospital, Berlin,

Is one of the most recent establishments in Germany.* It is only on a small scale, having room for 70 patients, situated in a crowded part of the city, but removed from the noise by being at some distance from the thoroughfare. It is three stories high, and contains wards for eight beds and some smaller ones, and is partly surrounded by gardens. It is built on the plan of the summer lazareth.

The space being limited, kitchen, engine-room, and offices could not be separated from the wards, but are under them.

The height of the wards in the first and second-floor is 14 feet, but in the third only nine ; their length 28, width 20 ; each patient has a space of 980 cubic feet. In the smaller rooms for paying patients the cubic space afforded is somewhat greater.

The corridors are nine feet wide and usually closed by glass doors. The nurses' rooms have glass windows to look into the wards.

The heating is partly by stoves, partly by hot pipes ; the stoves are German tile-stoves, some built through the wall. There are foul-air shafts.

The stairs are of stone, rising easily ; but the hall is not spacious enough. Closets, lavatories, and baths are in good condition, but do not offer anything of interest. Some of the former are badly placed, as they are in the middle of the building ; the drains necessarily run under part of it. An operating room is on the ground, another on the first floor.

This hospital has an out-patients' department. The patients are seen in the part that projects from the centre, on the ground-floor. The waiting room is on one side of the hall, the consulting room on the other, and the dispensary in the adjoining building. The prayer-room is over the out-patients' department.

The University-policlinic, Ziegelstrasse.

This is an institution for medical education. The building stands in the street in a line with the other houses, and consists of a front part three floors high and one wing ; a separate dead-house stands in the grounds which lie at the back of the main building.

* Esse, Dr. C. H. Beschreibung des Krankenhauses der jüd. Gemeinde. Berlin, 1861.

The front building contains on the ground-floor the resident medical officers' and clinical professors' rooms. The wards, for about 50 surgical cases, are on the two upper floors. Wards, beds, and arrangements for warming are on the same plan as in the Charité. In the wing we find on the ground-floor a lecture room for about 100 students, next to it a large waiting room for medical patients, and, separated from it by a lobby, the medical officers' room. On the first and second floor is a large operating theatre having space for more than 200 spectators, and here operations are performed every day, the more important ones on four days of the week. The waiting rooms of the surgical out-patients are adjoining. The economical administration is in the hands of the Charité directors, but the medical officers are appointed by the Government on being proposed by the university council. The clinical professors are called directors, and have three assistants each. The students not only see clinical cases treated, but out-patients as well; and are allowed to visit patients together with the assistant physicians, who lecture on the cases.

The Midwifery-policlinic in Berlin

Is an institution similar to the preceding one. It is in connexion with the university. It affords relief to poor women in their confinement, and medical instruction to pupils and midwives. The number of in-patients is limited, but that of out-patients is considerable. The building itself offers nothing worthy of notice; the clinical professor of midwifery lives there, and three assistants. It is also used for the examinations in midwifery which pupils have to pass for obtaining the licence of practice.

The Elisabeth Krankenhaus

Is a hospital for children which is situated in a suburb, and surrounded by large gardens. It is of moderate dimensions.

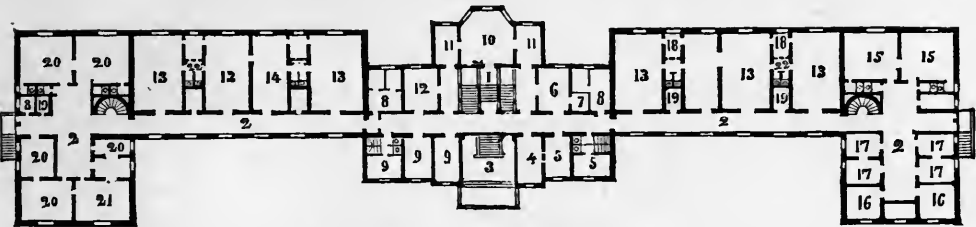
Bremen Hospital

Is a new building opened for patients in 1850, of imposing architectural proportions, to some extent resembling Bethanien. It is situated on the outskirts of a suburb, five minutes from the Weser river, surrounded by gardens and commons, and well supplied with water. The wards are situated to the south-east, the communicating spacious passage to the north-west. A block for contagious diseases is detached, and also the wash-house and steam-boilers.

The principal building consists of a central part and two wings in

line, the former three, the wings two stories high over a *sous-sol*. The central building contains dispensary, offices, medical officers' and directors' rooms.

FIG. 49.



On the Scale of $\frac{1}{8}$ of an inch to a foot.

Front.

BREMEN HOSPITAL.—GROUND-FLOOR.

- | | | |
|--------------------------|----------------------------|---------------------------------|
| 1. Stairs. | 9. Steward. | 15. Convalescent wards, 5 beds. |
| 2. Corridor. | 10. Operating-room, | 16. Special wards, 2 beds. |
| 3. Hall. | 11. Patients who have been | 17. " " 1 bed. |
| 4. Office for admission. | operated upon. | 18. Attendants. |
| 5. Medical officers. | 12. Linen stores. | 19. Sculleries. |
| 6. Dispensary. | 13. Wards for 10 beds. | 20. Children's wards. |
| 7. Laboratory. | 14. " 5 beds. | 21. W. C. |
| 8. Baths. | | |

The total number of beds is 272, distributed as follows :—

12 Wards for 10 Beds.			
3	"	6	"
8	"	5	"
2	"	4	"
6	"	2	"
4	"	2	"
16	"	1	"
Children's	"	30	"
Lying-in	"	20	"

272

The wards* are warmed by German stoves, placed near the wall ; there is no system of ventilation, but the windows are very large and high (11 feet), *croisées* and double ; the wards are lit by lamps.† The floors are oil-painted, as in the Berlin Charité. Some patients pay, others do not. The wards for the insane are completely separated and at a distance from the main building.

* See Fig. 1, No. 4.

† Dr. Eduard Meier, Notes on Hospitals.

Frankfort-on-the-Maine.

The general hospital, or Heilige Geist (Holy Ghost) Hospital. This hospital was completely rebuilt in 1833. It is constructed on the corridor plan for about 200 patients. It stands in large grounds near the promenade, and adjoining it is a large public garden. It has three floors, a centre building, and two wings attached to it. On the ground-floor of the centre building are the offices, kitchen, dispensary, and stores. On the first floor the directors' rooms and dining room of the officials; on the second floor the resident medical officers', and some small wards for paying patients.

The wards, three on each floor of the wings, are 40 feet long, 30 wide, and nearly 16 high, allowing a cubic space of about 1600 feet to each patient; they contain 12 beds. The bedsteads are of wood. Interposed between the wards are tea-kitchens, nurses' rooms, and waterclosets. The windows (three for a ward) are *croisées*, 9 feet high by $4\frac{1}{2}$ wide.

Admission is partly by payment and partly free. The hospital sends visiting medical officers to see the poor.

There are some smaller hospitals; one is called Bürger Hospital, another is the Rochus Hospital.

For syphilitic patients, midwifery cases, children and lunatics special institutions exist; they are of moderate dimensions.

Hamburg General Hospital.

This is a large hospital, situated near the Alster-basin, where the latter is joined by a wide canal. It stands at some distance from the thoroughfare, but not far enough removed to prevent the noise being heard. It was opened in 1823, and is composed of a central building and four wings, two old and two new ones, added in 1848. The central portion is three stories high, the wings only two. The out-buildings—kitchen, wash-house, drying-house, post-mortem rooms, ice-cellar, bedcarding rooms, and fire engines, stand separate in the grounds. Male and female patients are on different sides of the hospital. The large yard is used as a promenade by both, being divided by a granite causeway.

The wards of the old part are of various sizes. The small ones are reserved for paying patients; the large ones are 40 feet long, 24 wide, 13 feet high, and receive beds for 12 patients and a *male attendant*; the patients have about 1000 feet of cubic space. All the wards communicate with a passage, and have three windows opposite the door which leads to the passage. The windows are of the *croisée* type, 8 feet high, $4\frac{1}{2}$ wide; smaller panes can be opened separately. The ceilings are white-washed, the walls oil-painted; the German stoves—generally two—stand in the middle of the ward.

The new wings contain 480 beds ; some are in the basement. The wards are a little higher. They are warmed by stoves as in the old part, but there are more inlets for fresh and outlets for foul air. The bedsteads are of wood.

Steam is used in kitchen, wash-house, and other parts ; the water-closets are on the English pattern, and are properly drained. Baths are numerous, and there are also lavatories.

The medical director does not live in the hospital, but near it.

The greatest fault in the arrangements is that insane are received into the hospital, and the violent cases secluded in the cells of the basement. Children are not admitted. (See next page.)

Asylum Friedrichsberg is a new lunatic asylum, situated outside the town, at a distance of a mile from the general hospital. It was opened in 1864, and may accommodate 240 patients. It is in connexion with the lunatic department of the Hamburg hospital, whence patients may be transferred to it, and is under the same board of management, the "Krankenhaus-Collegium." A Jews' hospital has been opened recently in Hamburg.

Hanover Lying-in Hospital.

This is quite a recent building. It is a corridor hospital on a small scale and well arranged. The wards are small, and open into the common corridor ; they are warmed in winter time by hot air, which is forced in by a fan, and has to pass over hot plates before it is admitted.

Hanover Military Hospital.

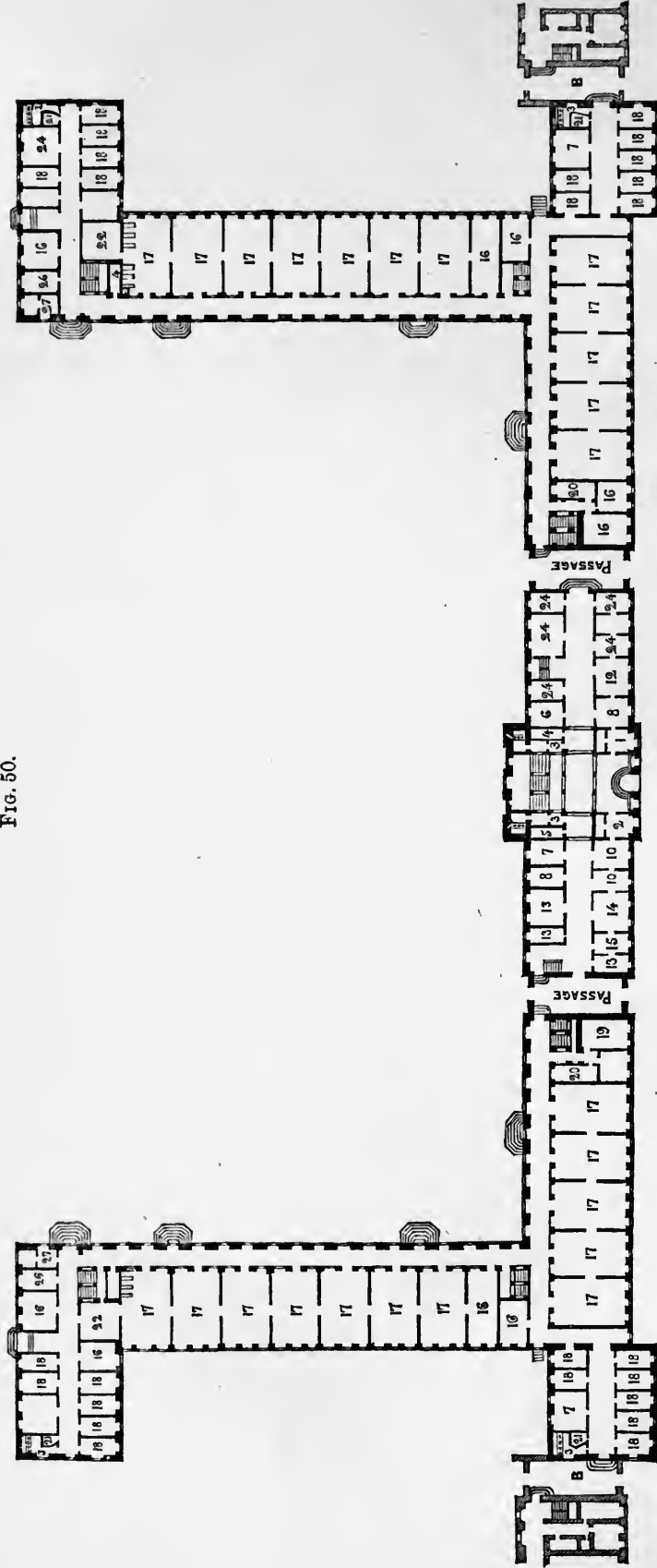
This is one of the few military hospitals where some special contrivances are adopted for ventilation. The lower part of the door which serves for the entrance to a ward has a square opening, by which fresh air can enter. There are some apertures for foul air communicating with the smoke-pipe. It is stated that typhoid fever patients have been observed to make a better recovery since this system was introduced.

Kiel Lying-in Hospital.

It was opened a few years ago. It is a corridor hospital, and has an excellent site overlooking the sea. It is three floors high. It consists principally of one block, but there are portions which project backwards from the centre and both ends. The wards (16 in number) lie in front of a common corridor ; one window is opposite the entrance. As these rooms are 13 feet by 16 and 14 feet high, a patient enjoys nearly 3000 cubic feet of air. The wards are warmed by calorifères.

The kitchen is an out-building connected by an underground

FIG. 50.



- On the Scale of $\frac{1}{8}$ of an inch to a foot. Front.
- HAMBURG GENERAL HOSPITAL.—GROUND-FLOOR.
1. Offices. 4. Scullery. 7. Baths. 21. Steam-boiler. 27. Sculleries.
 2. Porter. 5. Reservoirs. 8. Steward. 22. Stores. B. New wings added
 3. W. C. 6. Linen stores. 10. Steward's private room. 26. Nurses. in 1848.
12. Provision room. 15. Stores. 18. Wards (small). 19. Architect's room.
 13. Dispenser's room. 16. Wards (middle size). 20. Refreshments for patients.
14. Dispensary. 17. „ (large). SECOND FLOOR.—Wards in the central part only, stores, board-room, offices, &c. in 1848.
- FIRST FLOOR.—Similar arrangements, operating room. ONE-HALF OF BASEMENT.—Kitchen, stores, linen stores, servants' rooms, bath-rooms for lunatics, cells for the same.

tramway with the main building. Sculleries and baths are in the projecting portions above mentioned.

Leipzig Lying-in Hospital.

It was opened in 1854. The building is three floors high, a central corridor runs through its whole length, and the wards lie in front and back of it. They are about 12 feet by 15. The director is a medical man, who lives in the house.

Pupils and midwives receive a practical education here, and a polyclinic is connected with the institution.

MUNICH.

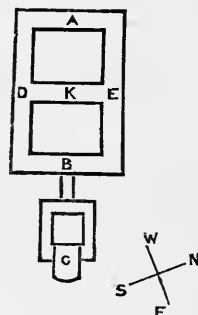
The Allgemeine Krankenhaus.

The building was founded by King Maximilian of Bavaria in 1808, and can accommodate more than 500 patients. It stands round two square yards, the passages run round the inner side. There are two floors over a ground floor. The transverse buildings are used, that in front (A) for offices and officials' private rooms; that in the centre (K) contains the kitchen and some private wards for paying patients; more wards of this description are in the building lying at the back (B), where are also found the dispensary, and amphitheatre. The chapel is in the building (C). The principal wards for females (D) are on the left, for males (E) on the right side, nine on each floor. They open on one side into the corridor, and on the other is a large window, 11 feet by 6. The wards are 38 feet long and 24 broad, 14 high. The floors are of polished oak, and have a beautiful appearance. Six beds stand on each side. The walls are coated with Parian cement, of a light green colour. There are night-stools in place of waterclosets.

System of Warming and Ventilation.—The lower wards have stoves standing opposite the windows, but there are not separate stoves in the upper wards; a hollow column of cast-iron ascends from the ground floor through all the three floors, and is heated only on the ground floor. It is surrounded by a mantel of glazed tiles, with ornamental apertures, through which the warmed air enters the wards.

There are apertures near the floors of the wards, three on each side, and from them channels for foul air lead to the stove on the ground-floor. Two air-towers are found on opposite sides,

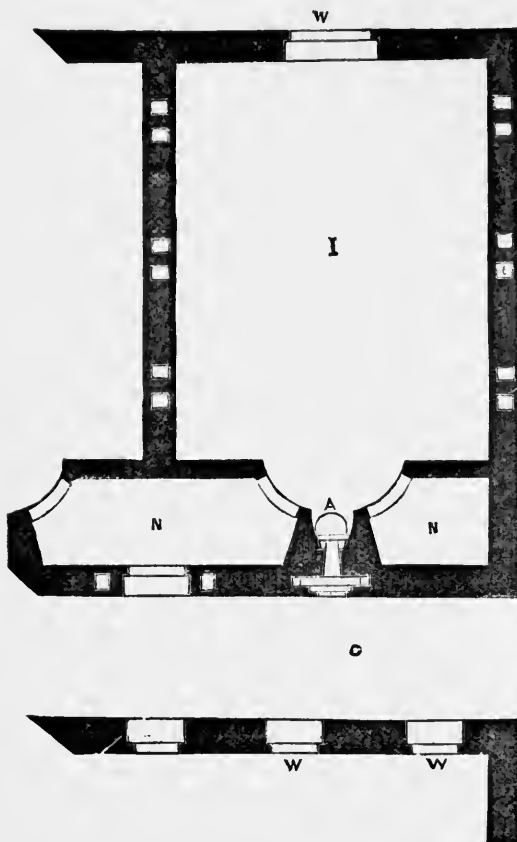
FIG. 51.



MUNICH GENERAL
HOSPITAL.—GROUND
PLAN.

and air-channels lead from them to the wards. Large horizontal channels run through the roof crosswise, and from these branch off smaller ones, which end in the space between the column and the mantel.

FIG. 52.



WARD OF THE MUNICH HOSPITAL.

- | | |
|-----------------|--------------------------------|
| A. Stove. | I. Ward. |
| J. Air-channel. | N. Nurse and nurse's scullery. |
| C. Corridor. | W. Window. |

This system failed; the air was often found stagnant in the foul-air channels, and even came back into the wards. The apertures had therefore to be closed in many places. The stoves are or will be used in future as calorifères, being heated from the basement.

The nursing is undertaken by Catholic sisters, and the convent and chapel (*c*) lie at the back of the hospital, but connected with it.

The house of the director and that of the superintending physician are separate buildings, surrounded by gardens. The grounds are tastefully laid out, and the patients are allowed to use them for walks.

Munich Lying-in Charity.

The building, opened in 1856, stands in a street surrounded by houses, consists of a central part and two wings. There is a ground-floor, *entresol*, and two floors over it. The corridor, 10 feet wide, runs through the centre on all floors, and has rooms in front and behind. A director lives in the house (on the ground-floor), and two resident medical officers, besides some midwives.

The large wards in the wings are 40 feet by 24, and 16 feet high, and contain six beds, so that 2000 cubic feet are allotted to each patient. Each ward has one large window, 10 feet high, and 6 wide. The entrance is opposite, through a lobby. The walls are stuccoed, and painted green.

A stove of considerable dimensions stands near the entrance. It is a calorifère similar to that in the Allgemeine Krankenhaus, but each is heated separately, and is supplied with fuel from the corridor; the air consumed by the fire comes from the ward. There is an air-tower in the centre of the building, from which channels or arteries lead to the wards; the channels end in the stoves at their base, and between the inner stove, which is of cast-iron, and its mantel, which is of clay tiles, having numerous apertures by which the air is expected to enter the ward. The air has frequently been found to be stagnant (about 25 times in 100), and even to flow in an opposite direction (17 times in 100), *i.e.*, back into the ward. The stoves were found sufficient to draw the air from the wards to a considerable extent, but not always in the desired quantity.

There is an amphitheatre for students, large waiting-rooms, and private rooms for secret confinements.

The director is a medical man, and member of the chief sanitary board of the town.

Aushülfe Krankenhaus, Munich.

The building has only been open a few months. It is near the Allgemeine Krankenhaus, and contains nine wards for eleven patients each. But as these are 40 feet long, 25 broad, and only 13 feet high, they do not quite come up to the standard of modern improvement. A new system of ventilation, as recommended by Dr. Böhm, is carried on; a description of it is given by Zenetti, the engineer.*

There are calorifères in the wards, composed of an inner stove of cast-iron, a brick mantel, and a moveable top made of tin; the latter has a large aperture. The outer air is admitted into the intermediate space from the floor in the usual way. There are foul-air channels leading to the roof; they end by two apertures in the walls of the wards, an upper and a lower one, and either may be closed by a valve. There is an anemometer placed in each channel, and a permanent indicator shows how the air moves inside, if rapidly or slowly. This is a novel and an economical system; but I doubt if it will be quite satisfactory, because the draft will not be strong enough in the eduction channels. In

* Zeitschrift für Biologie München, 66.

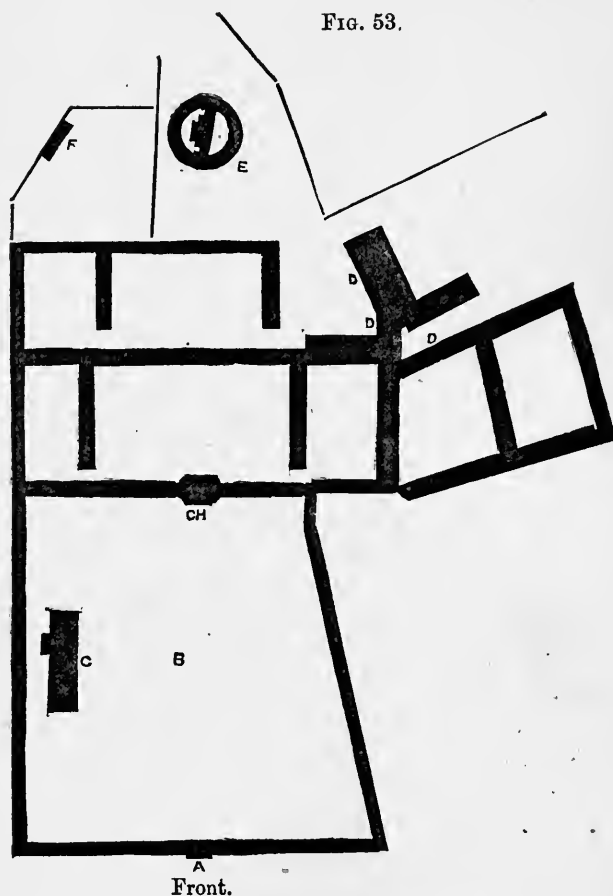
summer time this is to be improved by a gas-burner, which is lighted in the shaft near the roof.

This hospital affords an opportunity of transferring patients from the general hospital, should the latter be overcrowded or unhealthy.

*The Vienna General Hospital—Allgemeine Krankenhaus.**

It was founded in 1784 by the Emperor Joseph II., in the suburb Alservorstadt. The buildings composing it surround nine square

FIG. 53.



GROUND PLAN OF THE VIENNA GENERAL HOSPITAL.

yards, most of them laid out as gardens with fountains, one of them being nearly as large as all the others together. There are not

* Oppert, Med. Centralzeitung, No. 5, 1857.

more than two floors, except in one separate block, containing the clinical wards (e). Altogether there are 93 wards, excluding midwifery wards—50 for males, 43 for females. The hospital can accommodate 3000 patients, but the number is now generally 2000 or under, because new hospitals have been founded. There are four amphitheatres, two dispensaries, three laboratories, two large kitchens, one wash-house, several ice-pits, and many officers' rooms and offices.

The wards are lofty, and most have opposite windows, which are so high that the patients cannot look out of them. Some small wards are for four or six patients. Many of the wards have floors of red bricks. The clinical wards of Oppolzer have nine windows on each side, and 24 beds; those of Skoda, eight windows opposite each other, and 14 beds. There are separate lock wards and for skin diseases, and large midwifery wards for 500 beds, part of them private. Some time ago the cases amounted to 8000 in-patients per year. There are separate children's wards and nurseries.

There are stoves for heating, but no artificial ventilation; no waterclosets, but nightstools in the corners of wards, standing behind curtains (unless this has been changed recently).

Management of the Hospital.—The government is vested in the Stadthalterei (a government board). To them the director is subordinate; he is a medical man (Dr. Helm). Under him are the medical officers, stewards, attendants, and all officials. The director lives in the institution, and has his staff of clerks. He prepares the annual reports, and presides at the meetings of the consulting committee.

The whole hospital is divided into seven medical, four surgical, and six special divisions (*Abtheilungen*). There are nearly 100 clinical senior and junior physicians and surgeons, not including the *internes*, and more than 200 male and female attendants; there are nuns for some wards.

Mode of Admission.—All diseases are received, excepting small-pox. A physician and an *interne* (physician's assistant) examine the new-comers, and distribute them to the several wards; the interesting cases are reserved for the clinical wards. The patient is registered, taken to the cloak-room, bath, &c.

Medical Officers.—To begin with the *externes*. Qualified young practitioners offer their services to the director, who has the right to appoint them as *externes*. Usually this happens six months after application, there being many applicants. After a year or more the *externe* is advanced to an *interne* with a salary (24*l.*) The next

gradation is secundär physician, appointed by Government; they receive 40*l.* annually, and board and lodging. There are two higher classes, the primär; and lastly, clinical physicians.

The secundär physicians have to retire after four years' service.


Income (from one of the latest Reports).—To interest, 3400*l.*; patients, 28,000*l.*; donations, 5000*l.*, &c.—about 54,000*l.*

Expenses.—By salaries paid to medical officers and officials, about 6280*l.*; attendants, 3400*l.*; taxes, 170*l.*; interest, 1700*l.*; extraordinary expenses, 1000*l.*, &c.—altogether more than 50,000*l.*

The patients pay themselves, or the municipality or parish for them. There are three classes—the first, who pay 4*s.* 4*d.*; the second, 2*s.*; and the lowest class, who pay 10*d.* per day.

The mortality in the hospital is between 12 and 13 per cent.

The Wieden Hospital

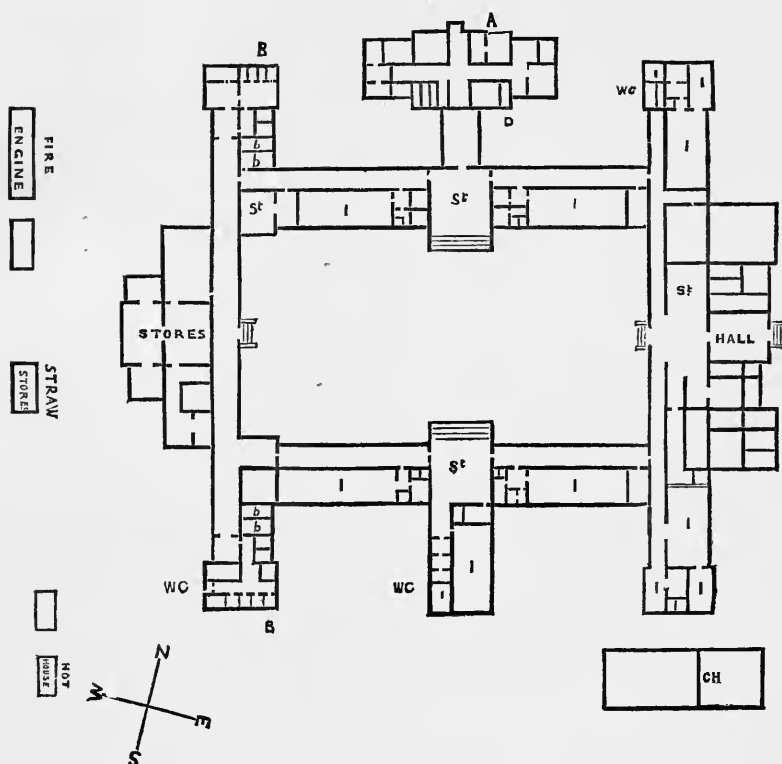
Was opened in 1848. It is built in the horse-shoe form, surrounded by gardens, and can accommodate 1015 patients. The chapel lies at the back of the yard, and ice-pits, dead-house, amphitheatre &c. are separate buildings. There are three floors. The wards are single, and similar to those in Guy's and the London Hospital (*accouplées*). Bath-rooms, waterclosets, and rooms for the attendants adjoin them. 

The hospital is divided into seven divisions; there is one chief director (a medical man, Dr. Melzer). Each division has one senior physician and three physicians; every ten patients have one (lay) attendant, male or female; 34 officials also live in the house. The director is under the same board as the director of the Allgemeine Krankenhaus, and he is supported by the economical committee, consisting of the medical officers and the two economs. He presides at their meetings.

Hospital Rudolph-Stiftung.

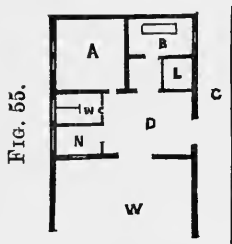
It was founded by the Emperor in memory of the birth of his eldest son, and having taken for its construction and fitting up four years and three months, was opened in 1865. It has room for about 800 patients. To adopt the pavilion plan, as represented by Lariboisière, was not thought compatible with the climate of Vienna, and therefore a plan which is supposed to combine the advantages of the corridor and pavilion system was preferred. The principal corridors face the north and west, and the large wards the south and east; the building (A) Fig. 54, where offices, private rooms for medical men and officials are situated, is detached. Three pavilions, containing sick wards, stand exposed to the free circulation of

Fig. 54.



GROUND PLAN OF THE HOSPITAL RUDOLPH-STIFTUNG.

- | | |
|------------------------------|---------------------------|
| A. Block for administration. | D. Dispensary. |
| 1. Wards and side wards. | St. Stairs. |
| Bb. Common bath-rooms. | Ch. Chapel and deadhouse. |



Arrangement of baths, waterclosets, scullery, and nurses' rooms in Hospital Rudolph-Stiftung.

- | | |
|---------------|----------------|
| A. Side ward. | L. Lift. |
| B. Bath. | N. Nurse. |
| C. Corridor. | W. Large Ward. |
| D. Ante-room. | |

atmospheric air; they project 84 feet from the main building, and are 126 feet distant from each other.

The principal buildings stand around a rectangular yard, 180 feet by 330, tastefully laid out with shrubs, forming a garden. There are two floors over a ground-floor, and a basement runs under the greater part of the buildings. The hall being only one story high, the court is open at the side facing the east.

The large wards are $26\frac{1}{2}$ or 28 feet wide, 17 feet or (on second floor) 16 feet high, and of different lengths, some about 80 feet; they have parquet floors and windows on one side, excepting those in the above-mentioned pavilions. The cubic space allotted to each patient is 1480. The windows are 10 feet high, and double; the lower parts open like doors, a third of the upper part inclines inward (interior and exterior windows at the same time), and can be fixed in any desired position by a screw and toothed wheel.

The corridors have glass doors, and the wards are separated by spacious staircases. They are entered from an anteroom which communicates with the corridor. This room serves as scullery. A nurse-room adjoins the ward; it has a window overlooking the latter. The waterclosets, containing basins of enamelled iron, are next to the nurse's room, and a bath-room and lift are placed as seen in Fig. 55. The baths are of zinc, and the bath-rooms have a window looking into the corridor; they also contain a stove. The wards are warmed by Dr. Böhm's calorifères, which are partly used for ventilating the rooms; but the principal means of ventilation are the windows. The lighting is by gas, and the globes are ventilated.

The beds stand at some distance from the walls ($1\frac{1}{2}$ feet), and have palliasses, flock and thin hair mattresses. There is a head-shelf of tin, painted black.

A tramway runs in the basement, and is used for conveying food, medicines, washing, and the dead.

There are a great many baths of every description in the common bath-rooms (Bb); the kitchen is in the building opposite the entrance hall. Two large ranges stand free in the centre, and have descending flues. On the first floor over the kitchen are large linen-stores, and the chapel is on the second floor.

Administration.—The hospital is under the Stadtholder; its director is a medical man appointed by government. There are seven divisions for administration, each presided over by a primär-physician; three secundär-physicians are under the latter. The regulations are the same as in the Allgemeine Krankenhaus. The hospital is a general one, and admits all diseases, excepting smallpox. The physicians go their rounds daily, early in the morning. The secundär-physicians attend the reception-room in rotation, and their turn comes every third week. A male cook superintends the kitchen; there is one steward and seven officials. Male nurses are only for the wards where patients suffer from skin diseases, females in all the others. One engineer is kept to attend to the engine-room. The cost of construction was £250,000.

Another hospital for adults, called "Of the Brothers of Mercy," containing 200 beds, and two children's hospitals, may be men-

tioned—the “Joseph’s Spital,” containing 40, and the St. Anne’s hospital, containing 80 beds:

Vienna Military Lazareth of the First Army Corps.

This hospital possesses Dr. Böhm’s artificial system of heating and ventilating. There are water-stoves somewhat different from those usually found. The stoves are composed of two iron boxes 4 feet high, 1 foot broad, and $4\frac{1}{2}$ feet long, connected with each other by a pipe. They are surrounded by ornamental perforated tin, and supposed to heat better on account of the large surface they form. Warm air is forced into the wards in addition by a fan—having passed through coils of pipes outside the ward; this air is presumed to be pure.

Opinions are divided about the efficiency of this system.

HOLLAND.

Rotterdam Hospital.

It was opened 1850. Its site is bad, as it stands on humid ground, like so many other buildings in Holland. The hospital is composed of one block, which has a frontage of 250 feet, and a central portion projecting at the back. Men and women are divided only by the spacious hall, where they can meet. 265 patients can be accommodated; the paying ones in the central part. There is a spacious staircase in the centre, and well staircases are at both ends; lifts are also used.

The principal wards are situated in front of a common corridor, into which they open; a large window is opposite the entrance-door (Fig. 1, No. 4). Conveniences and lavatories are partitioned off the wards at both sides of the entrance-door, and receive light from the corridor. The larger wards contain ten beds, the smaller ones (for paying patients) three or four. The first are thirty-three feet long, twenty wide, and fourteen high, affording 924 cubic feet to each patient, but the top wards afford even less cubic space. The boards of the floor are of pine-wood, and kept very clean. The wards are heated by calorifères; ventilation is due to doors and windows.

Steam is used for different purposes: for the lift, in the wash-house, dispensing-room, baths and kitchen. Much attention is paid to cleanliness, as is commonly the case in Dutch houses.

ITALY.

The Italian hospitals are to great extent old charities, founded in the middle ages. In no other country have so many convents been

transformed into hospitals, as the founders belonged generally to religious fraternities. In the hands of the latter, the administration generally rests, but laymen are appointed as directors. In some instances the director is a medical man, as at Milan. Monks and nuns attend as nurses in most establishments. The separation of sexes and different classes of patients is much neglected, and frequently sick, lunatics, and aged, are found domesticated in one and the same establishment. Some hospitals undertake to visit the patients at their homes. In the lying-in wards great secrecy is observed, and females are admitted without being obliged to give their names (Venice, Rome).

The construction of verandahs in some of the hospitals is remarkable.

Florence.

The largest hospital is called Ospedale di Sta. Maria Nuova; it adjoins the church of the same name. It is very old, having been founded in 1289, and by the addition of several wings is now of an irregular shape. There are 600 beds for males, and as many for female patients. The number of wards is about fifty. The kitchen is worth a visit. A medical school and public dispensary are connected with it.

Geneva.

The general hospital is called Ospedale Grande; it is a large building constructed around five yards. It is of ancient origin. Another, called Osp. degl' Incurabili, is of less extent, and of an irregular shape. As the name implies, it is especially intended for incurable diseases.

Mantua.

The largest military hospital of Upper Italy, was founded here by the Austrians. It is notorious for its unhealthiness, being badly situated on low ground, near the shore of a large lake, Lago Maggiore, where malaria is endemic. The civil hospital is an old, irregular, and defective building.

MILAN HOSPITALS.

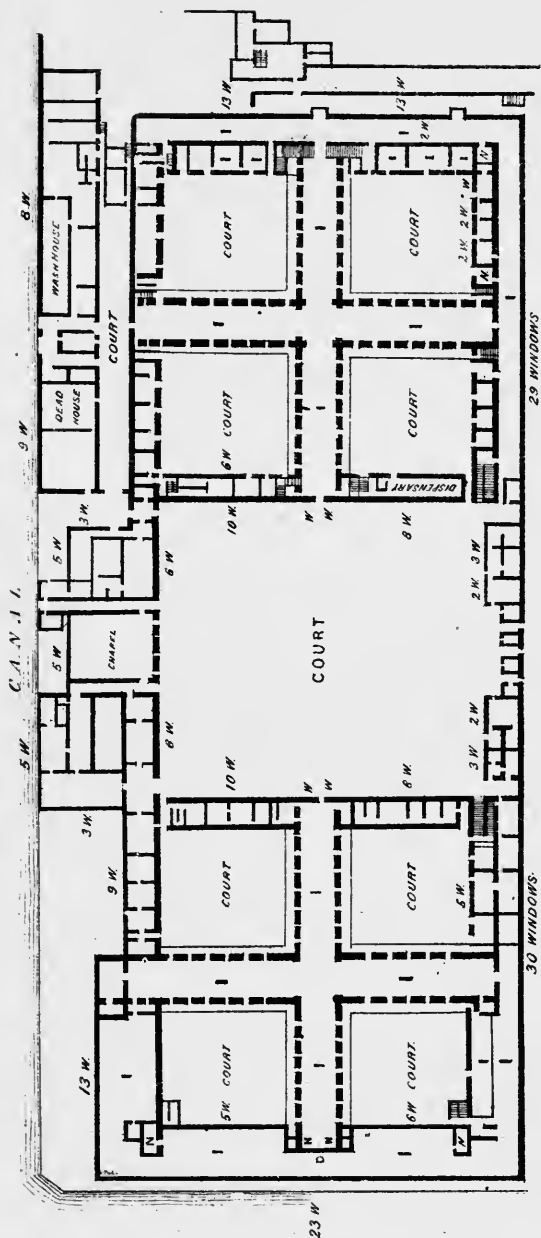
*Grand Hospital (Ospedale Maggiore).**

I will give a description of this establishment, because it was many years ago considered as a model one. I was not favourably impressed by it when I paid it a visit. Many historical recollections are connected with it, and it contains, like all public buildings

* Dr. Verga, Dell' Ospedale Maggiore di Milano e delle sue case sussidarie. Estratti delle atti del R. Istituto Lombardo Ven. V. iii.

Fig. 56.

Grand Hospital of Milan.



FRONT.

- D DOOR.
- N NURSE.
- W WINDOW.
- I WARD.

in Italy, objects of art; the mediæval style of the building is of interest to an architect. It was opened in the year 1456, and can contain nearly 3400 patients, but the usual number is under 2500. It is situated close to a thoroughfare, and a canal runs at its back, the water of which moves a flour-mill. used to grind corn for the inmates. The buildings are one story high, excepting in the centre, where we find two floors.

The buildings stand around square yards, the principal one being much larger than the others. The principal wards form a cross, in the centre of which is a cupola, with an altar beneath it, where divine service is performed daily in sight of the patients. These wards have corridors on both sides, which are not so lofty as the ceilings of the wards, and consequently there is plenty of room for windows above these passages. The height of these wards is between thirty and forty feet at the highest point; the ceilings are vaulted, the floors covered with red bricks or flags—this being preferred for coolness. The outside wards are nothing but spacious corridors: the latrines are at one end, and the less said about them the better. There is no warming apparatus, but small portable stoves for charcoal; they are rarely used, the climate being so mild. The windows are used for ventilation. The cubic space for each patient is more than 2000 feet. (See Fig. 56.)

Six other establishments distributed over Milan are in connexion with the principal one. One is for small-pox, another for syphilitic, a third for children, a fourth for itch, a fifth for chronic cases; and the sixth is a lunatic asylum. They contain between 100 and 200 beds each, and all but one were convents.

Modena

Contains a civil hospital, which is partly of modern construction, and has large airy wards.

Novara.

Here we find a hospital of more modern origin; it can accommodate 300 patients, and contains lying-in, lunatic, and children's wards.

Naples

Contains a great many establishments, varying in their construction. The famous Albergo dei Poveri is a compound establishment, a vast irregular building, with two large square yards, and eight smaller ones. It receives sick and invalid poor. Another is called *degl. Incurabili*, but it is not now used for this class exclusively. A third is the *R. Osped. di San Eligio*, a fourth *R. Osp. di San Gennaro dei Poveri*. They are all old buildings, but there is a new one of peculiar con-

struction, called Della Pace. It was originally a palace. There is one large ward, 300 feet long, and 130 wide, with an arched ceiling supported by fine columns.

Rome.

The following are the principal establishments:—The Ospedale della Consolazione is for surgical cases only. The Ospedale di S. Giovanni is also for surgical cases. It contains seventy-four beds, and is supported by voluntary contributions. Osp. degl. Incurabili, is a hospital and hospice in one. Osp. di San Spirito is the principal general hospital; it can accommodate 3000 patients. Generally the number is between 1500 and 1600. It was founded in 1717, and is very defective. Connected with it are a medical school, anatomical museum, and library; a foundling hospital is under the same board of administration.

Osp. di San Rocco di Martino is a lying-in hospital (with private wards). Osp. di San Galicano is for skin diseases. It contains two large wards, which hold 100 patients each.

Osp. Sta. Maria della Pietà dei Poveri Pazzi is a lunatic asylum near the Porta di San Spirito, in Trastevere. It has 500 inmates, and is connected with the general hospital.

There are numerous special hospitals for Poles, Germans, Florentines, Lombards, Portuguese, &c.

TURIN HOSPITALS.

Ospedale di S. Giovanni Baptista.

This is the largest and oldest hospital in the city. It can accommodate 600 patients. The buildings by which it is composed stand round seven rectangular yards; the church is opposite the principal entrance. The number of patients received annually is about 2000. The men are on the ground, and the women on the first floor; the wards are warmed by wood fires. Nursing and attendance is performed by twenty-two sisters, twenty-two *infirmiers*, and seventeen *infirmières*.

Ospedale Pazzarelli

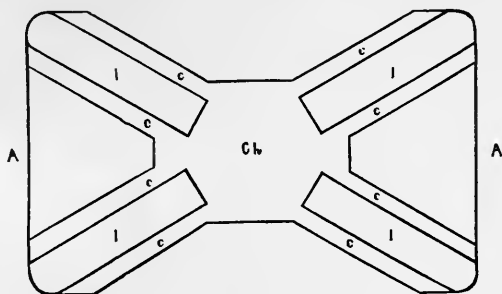
Is a long building just outside the town, for idiotic children.

Ospedale San Luigi di Gonzaga.

This is the most interesting of all, and already described by other authors. It is built in the form of a cross, and was intended* for a dwelling-house of Gonzaga, a nobleman of Turin. It was finished in the year 1794, and afterwards converted into a hospital.

The chapel (Ch) is in the centre. The principal blocks are two floors high, over a basement, and contain a single ward each for

FIG. 56.



HOSPITAL GONZAGA.—FIRST FLOOR.

twenty-four beds; nurses' rooms and the usual requisites are conveniently arranged near the centre. The wards are four; two for males and two for females. They have corridors on each side. The beds stand close to the wall, in which is an opening over the patient's head. It serves for supplying food, medicines, &c., without any one entering the ward. Another aperture serves for a sink, to throw down the excreta. The latrines have marble seats, and a water reservoir above. Ventilation is effected at night by six large fires in the cellars.

Large terraces close to the wards are used as walks by the patients. The outbuildings, offices, dispensary, physicians' room, dead-house, are placed at the right and left side (A, A.)

The hospital was originally intended for incurables only, such as consumptive, cancer patients, &c.; but in 1833, Charles Albert added twenty-four new beds for skin diseases.

The fraternita di San Luigi manages the hospital, and also takes care of the sick at their homes, by visiting them and sending a doctor.

The Regilo Manicomio

Is an old lunatic asylum, built in 1728.

RUSSIA.

Although it is somewhat difficult to get information from Russia, I am nevertheless enabled, by the kind assistance of some medical friends who visited the hospitals of Petersburg and Moscow, to supply some reliable information.

The principle of centralization is carried further in hospital and

medical matters than in any other country. The hospitals and hospices are under a central board, at the head of which is a medical man appointed by the emperor. All the functionaries of the hospitals are under his control, including physicians and surgeons. He appoints the directors of the hospitals.

There is another board for administering relief to the sick poor at their own habitations (in Petersburg), and to superintend the system of out-door relief. This is the Philanthropic Society, the president of which is appointed by the emperor. The president is (at the present time) not a medical man; all the bureaux de bienfaisance are under his supervision. The city is divided into districts, and medical officers and midwives are appointed for each; the former attend to the patients in a similar way to the poor-law medical officers in Germany, having certain hours for consultations twice a day, &c.

An order of Sisters of Mercy was founded in Petersburg, by the Grand-Duchess Helen, in 1854; its members belong to every creed.

The Hospitals of Petersburg and Moscow

Are remarkable for their palatial appearance; their elevation corresponds to that of the surrounding buildings, and they are three or four stories high. They are generally built on the corridor plan, and stand in large gardens. Some have summer lazarettes attached to them, like the Berlin Charité. The system of heating the wards is objectionable. It is carried on mostly by Russian stoves heated from the basement, and the heat is very dry. Some of the stoves are similar to those used in North Germany (tile-stoves). Wood is used as fuel. Some wards contain open fire-grates in addition to the stoves. The windows are used for ventilation; they are croisées, but small casements (Klappenfenster) are found, which open inwards.

Special hospitals exist for children, with convalescent institutions situated in the country; they have large pleasure-grounds attached to them. There is one hospital for incurables in Petersburg.

The military hospitals are on a level with the general ones. The nursing is in some institutions (for instance, children's hospital), undertaken by the Sisters of Mercy, but elsewhere by male or female attendants: widows are preferred for the latter. Admission is free, and all patients have a bath before they are allowed to enter a ward. Clergymen of every denomination have free access to the hospitals.

Temporary dispensaries were opened in Petersburg during the cholera epidemic, and as a curious fact I may mention that the medi-

cine bottles were generally without labels, because few of the applicants could read.

The Alexandrow Hospital.

The plans for the Alexandrow Hospital have reached me too late for publication. The hospital is built on the corridor plan, and has been recently opened for patients. There is a large closed yard, around which the buildings stand. The chapel and some of the large wards are in front, small wards for one or two patients are at each side, and also at the back, which is half-moon shaped. Two wings branch off from the front building, two from the sides, and two from the portion behind. These wings are exposed to the free circulation of the atmosphere, and are called pavilions; the first named serve for offices, dispensary, private rooms, and some of the wards; the four others for patients, and contain large wards, resembling those in Fig. 1, No. 4. They contain 12 beds and tiled stoves. Baths and waterclosets are generally placed at the further ends of the wings.

Kitchen, dead-house, and wash-house are detached in the grounds.

Petersburg Lying-in Hospitals.

A large establishment which can accommodate 300 persons is now on the point of being closed. It is a defective building, considered very unhealthy, warmed by the common (petchka) stoves, and badly ventilated. Some artificial means of ventilation, such as gaslights placed in flues, are of little use. There are private (secret) wards for paying patients.

The institution of the Grand-Duchess Helen consists of an old part, which was built more than thirty years ago, and a new one, the erection of which was patronized by the lady the name of whom the hospital bears at present.

The whole has an irregular shape; the old part contains two floors, the new one three; about fifty beds (not including the cribs) can be placed in the wards. The old part has the shape of a letter L (reversed), and one portion contains a central corridor, into which small rooms open on each side; the other has one corridor running along the wards.

In the new part, which has the form of an open quadrangle, the sick wards are small, for one or two inmates. Most of them contain open fire-grates; there are tile-stoves in some others. The wards open into each other, and are situated back to back on each side of a central wall.

The director is a medical man, and he is helped by four assistants. Midwives live in the building.

The "new lying-in hospital" is three floors high, and built on the corridor plan, in the horse-shoe form. In the centre of the main building is the staircase; five wards lie on each side of it. These wards have two windows opposite the entrance-door. The wings contain five similar wards each. Sculleries, waterclosets, and recreation-rooms are conveniently arranged. There is no garden to this institution.

The lunatic asylums in Russia are being at present reorganized. The corridor plan is adopted for that of Kasan, and is likely to be followed in the construction of some others. This is to be regretted, the more so as the corridor is not intended to be more than six feet wide.

The Petersburg German *Medical Times* gives, from time to time, the number of inmates in the various hospitals.

On July 1, 1866, there were in Obuchoff's Hospital 749 male and 293 female patients—1042 in all. On August 1, 520 m. 242 f.=762; the difference was owing to the cholera epidemic.

On the same days, in the temporary military (cholera) hospital, 557 and 330 respectively. In the Marien Hospital, on July 1, 249 m. 175 f.=424. In Peter-Paul's Hospital, on the first-named day, 218 m. 150 f.=368; on the other day, 163 m. 94 f.=257. In the Maria-Magdalen Hospital, on July 1, 195 m. 35 f.=230; on August 1, 143 m. 27 f.=270. In the Alexandrow Hospital, in August, 180 m. 55 f.=240. The number of inmates in the Kalinkin Hospital and Maximilian Hospital is not mentioned; the latter is especially an ear hospital.

The principal lunatic asylum, which can accommodate 300 patients, is outside the town. There are large poor-houses in Petersburg, somewhat resembling the English workhouses.

SPAIN.

I translate from M. Husson's "Etude" the following notice about the Princess Hospital in Madrid:—

It is situated on the north of the town, and constructed after the model of Lariboisière, and composed of eight pavilions; four on each side of a yard. They have only two floors; both for patients. In front and in the centre are offices, rooms for officials, and the chapel; at the back are the dispensary, baths, linen stores, instruments, latrines, and wash-house. There are sixteen wards for 20 beds, two for 10, and one for 24. The wards are $35\frac{1}{2}$ feet long, 21 wide, and $14\frac{1}{2}$ high, in order to supply twenty-one cubic metres per bed.

The ward for 24 beds and the operating theatre are paved with blue tiles from Valence. All diseases are received, excepting syphilis, cutaneous, incurable and mental maladies.

There are between 300 and 350 beds, but not more than 300 in-patients are received annually. In summer time the hospital is nearly empty. Surgical cases have the preference. There is a singular custom here, daily reports are published about dangerous patients, and open for the inspection of the relations and the public.

The General Hospital

Is a building for 1600 patients, built about 1780. The buildings stand round square yards, and have a considerable elevation; some are four floors high, others five. Men and women are in different parts of the hospital, and there are male and female children's wards.

Besides medical and surgical cases, we find eye patients, prisoners', lying-in, and lunatic wards.

The number of wards is 44. Many contain a great number of beds: more than 70 or 80; but there are smaller wards for 10 or 15. There are separate rooms for paying patients and those of position. Bath-rooms and separate operating rooms are between the larger wards. Most wards are paved with asphalte.

The nursing is in the hands of monks and sisters.

A school of medicine is connected with the hospital. The latter has many of those defects which do not occur in more recent buildings.

SWITZERLAND.

*Zürich Hospital.**

It is composed of a principal building and detached blocks. The dead-house and school for anatomy form an important part of the whole, with which they are connected by a gallery. The two wings of the principal building are two stories high, the central pavilion between them is three stories high; the front is 589 feet long. The central pavilion contains offices, store-rooms, dining-rooms for the servants, dispensing-room, committee, medical officers', and reserve rooms.

Men are on one side of this pavilion, women on the other. There are five wards on each side, and altogether on each floor 20: the ceiling is vaulted, 14 feet from the floor. The wards are

* Dr. Schräml's Beschreibung, &c.

29 feet broad, 42 feet deep; between two wards is a room for the nurses (male).

The cubic space of a ward is 14,112 feet. As there are only 10 beds in the surgical wards, each patient is allowed 1411 cubic feet; in the medical ward only 1175 cubic feet, as there are 12 beds. The bedsteads are of wood, and placed *along* the walls; the windows open on little balconies.

This is one of the few hospitals where waterclosets have been abolished after existing for a time. But they were constructed in a complicated manner (self-acting), and the pipes were not protected from freezing. They have been replaced by cast-iron vases, which have a rim for water at the top, so that the couvercle closes water-tight when let down; but there is no second couvercle, so they are always wet. There are also simple night-stools near the wards.

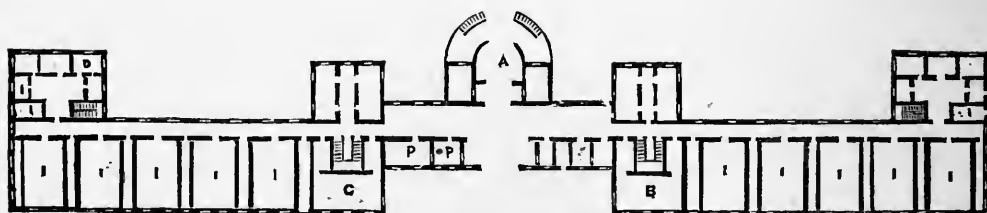
The nurses' room is situated between two contiguous wards.

The front building contains tile stoves for warming; the wings hot-water pipes. They form coils near the walls, and are surrounded by perforated plates, so that they resemble stoves. Fresh air is admitted, and gets warmed by passing through these coils in the usual manner. There are also casements in the lower parts of the doors; when open, they admit the air from the corridor.

The kitchen is in the basement, in the centre of the projecting portion. It is large and airy, but the steam is sometimes unpleasant. The wash-house is separate, and the engine-room near it.

A separate building for contagious diseases stands at some distance from the principal one.

FIG. 58.



On the scale of $\frac{1}{8}$ of an inch to a foot.

Front.

ZÜRICH HOSPITAL.—GROUND FLOOR.

- | | |
|---------------------------------------------|----------------|
| A. Operating room, kitchen in the basement. | D. Bath-room. |
| B. Rooms for admission. | P. Dispensary. |
| C. Lecture theatre. | |

REMARKS ON THE METROPOLITAN POOR BILL: AND CONCLUSION.

Mr. Hardy's Metropolitan Poor Bill marks the beginning of a new era in the whole system of relief to the London poor, and I may therefore venture to make a few observations on the way in which it is likely to work, and how it may affect existing institutions. The changes it is likely to create, though gradual, will not be less effectual and beneficial.

As regards the proposed lunatic asylums, their dimensions, site, and number should be determined by competent authorities, and for this careful statistical researches are much needed. The desire to adopt existing buildings for the purpose should not lead to defective arrangements. (See p. 5 and 71.) A school of mental science as such existed at one time at the Salpêtrière (see p. 176) may be established at one of the asylums, but more than one school would not find the necessary support by lecturers and pupils.

The power which the bill gives to the Poor Law Board of directing boards of guardians to provide dispensaries, should be used with discretion, and I may reasonably suppose that as the bill is permissive those local boards that act on sound principles will not be interfered with. Several points should be clearly defined, in order that the boards of guardians may act on a uniform plan; for instance, the visitation of the sick poor; and whether it be undertaken by the dispensaries. The duties and qualifications of dispensers and medical officers should not be matters of doubt and uncertainty. Midwives might be attached to the dispensaries.

Although the new dispensaries are only intended for the poor who actually receive parish relief, I do not believe that this distinction will be always rigorously observed in practice; and therefore in the course of time the usefulness of the free dispensaries will be somewhat curtailed, and they will lose some of their subscribers. These institutions, in order to retain their position, should—as suggested in another place—become a means of medical instruction. (See p. 77.)

The workhouse infirmaries (see p. 75) should principally admit those who fall sick among the workhouse inmates, and therefore would not require space for more than 200 patients. An effective means of preventing over-crowding would be by the boards of guardians farming beds in the existing hospitals (see p. 146) whenever their institutions are unable to admit all those who apply. It has

become a matter of complaint in the country that the schools of medicine are deprived of interesting cases, and the *post-mortem* rooms of dead bodies by large workhouse infirmaries being founded in their neighbourhood (Oxford). If the proposed arrangement was adopted, the efficiency of these schools would not be impaired.

As regards the new committees of dispensaries and asylums, some practical difficulty may arise in finding so many gentlemen willing to undertake the task without compensation, and the number of those competent to superintend the management of lunatic asylums is limited. (See p. 74.) I do not fear that discord will reign in these committees in consequence of their being composed of £40 and £100 rate-payers, because experience shows that members belonging to different classes of society work well together for charitable purposes.

One of the most beneficial results of the bill will be that a better class of medical men will attend to the sick poor, as they have nothing to do with the dispensing of medicines. It is very likely that able young practitioners educated for attaining the highest position in the profession, will cheerfully undertake the duties. Many medical men are likely in future to avail themselves of this chance of getting into practice without becoming shopkeepers. Perhaps the poor themselves will prefer the new system of receiving a prescription in place of the old method.

As the existing defects of parish relief are remedied, the general hospitals will have to bestir themselves to conform with the requirements of the times; unless they wish to lose their high position. They will have to alter the regulations for admission, open some of their wards to the sick poor without distinction, and at least have one emergency ward for medical cases as they have one for accidents.

The Poor Law Board should have the advice of the most experienced members of the profession in all sanitary matters. They might either be *ex-officio* members of the board, or form a permanent consultative body.

In conclusion, I venture to suggest, that a commission of competent medical men should—if not appointed by authority—meet of their own accord, to decide on the following questions respecting the system of medical relief in London:—

1. How to manage the affairs of dispensaries, workhouse infirmaries, hospitals and special hospitals, so that they do not interfere with each other's interests.

2. Which of these institutions should be used as a means for medical education.

3. Which institutions should become a means for training midwives on the same principles as the Hebammen Institute. (See p. 65.) How long should the course of instruction last, and who should compose the board of examiners.

4. How to effect a partial change in the present system of admission into hospitals.

5. If a popular treatise could be prepared containing special instructions on ventilation for the nurses and house-surgeons.

6. Should night-nurses exist? (See p. 56.)

7. To prepare tables of statistics respecting zymotic diseases for hospitals, workhouse infirmaries, and special hospitals, and to determine the necessary water-supply per head per day, by careful investigations made on a uniform plan.

8. To district the metropolis for dispensaries, and for the visitation of the poor in a more efficient manner.

9. To consider if it would not be advantageous to form a pauper pharmacopœia (see p. 81) for the use of the new dispensaries.

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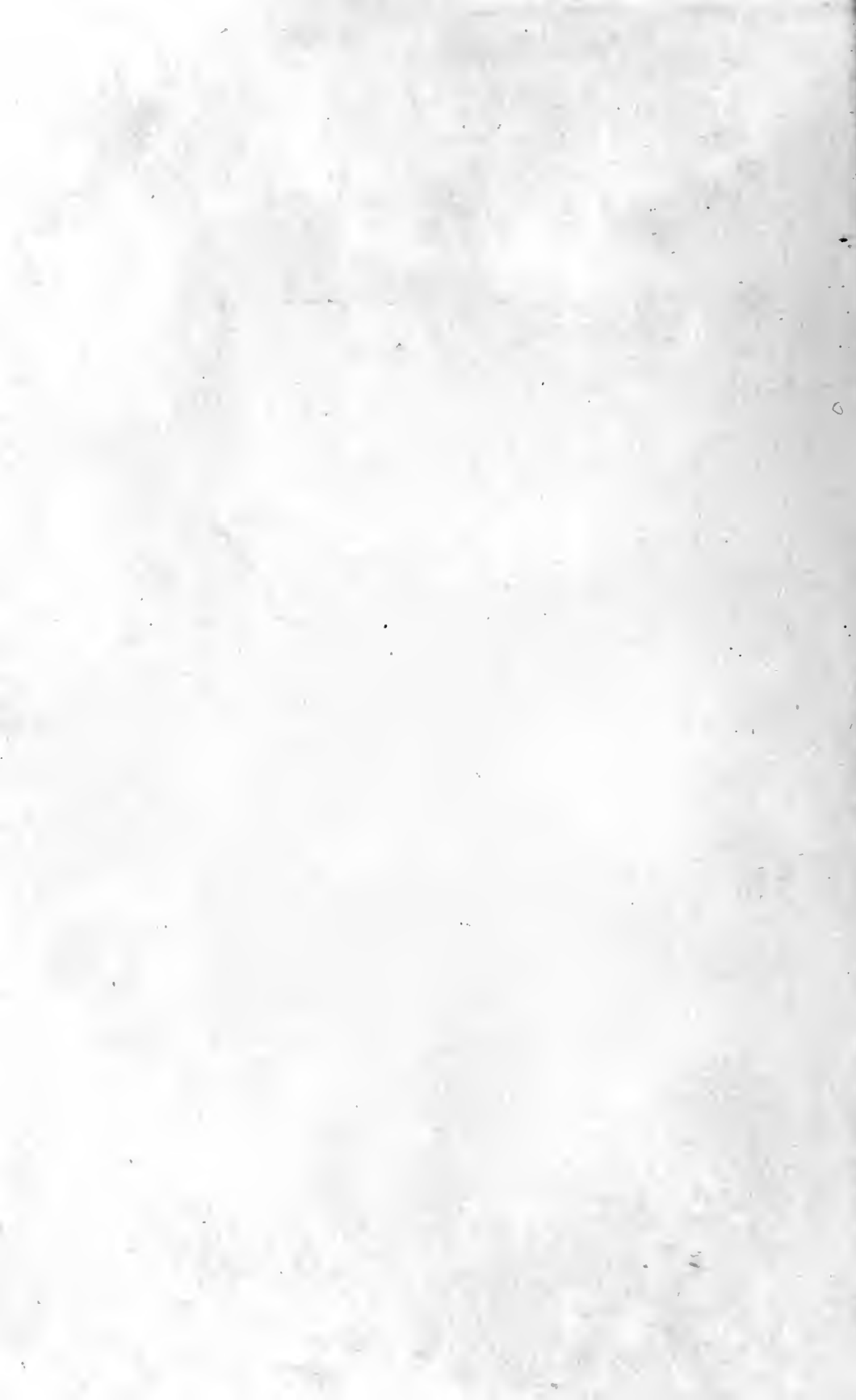
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LONDON :
SAVILL, EDWARDS AND CO., PRINTERS, CHANDOS STREET,
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